REPORT RESUMES

ED 012 504 EA 000 636

EDUCATIONAL DATA PROCESSING IN ILLINOIS PUBLIC SCHOOLS, AN INTRODUCTORY MANUAL.

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ILLINOIS STATE OFF. SUPT. PUB. INSTR., SPRINGFIELD
REPORT NUMBER CIRC-A-168 PUB DATE 65
EDRS PRICE MF-$0.50 HC-$3.88 97P.

DESCRIPTORS- *DATA PROCESSING, *PUBLIC SCHOOL SYSTEMS, *SCHOOL ACCOUNTING, CENSUS FIGURES, ATTENDANCE RECORDS, ACADEMIC RECORDS, SCHEDULING, *PROGRAM DEVELOPMENT, *COMPUTER ORIENTED PROGRAMS, COSTS, TABLES (DATA), CHARTS, ELECTRONIC EQUIPMENT, MANUALS, SPRINGFIELD, ILLINOIS

THE PRESENT TYPES AND AMOUNT OF DATA PROCESSING USED IN ILLINOIS PUBLIC SCHOOLS ARE DISCUSSED. ONLY 66 OF 964 SCHOOL DISTRICTS RESPONDING TO A QUESTIONNAIRE REPORTED USE OF DATA PROCESSING. THESE INCLUDED, HOWEVER, 43 PERCENT OF THE TOTAL PUBLIC SCHOOL ENROLLMENT. DIFFERENT AREAS IN WHICH DATA PROCESSING TECHNIQUES ARE USED INCLUDE (1) SCHOOL CENSUSES, (2) FINANCIAL ACCOUNTING, (3) ATTENDANCE ACCOUNTING, (4) GRADE REPORTING, AND (5) STUDENT SCHEDULING. CONSIDERATIONS FOR THE ESTABLISHMENT OF A DATA PROCESSING PROGRAM ARE ALSO DISCUSSED. (HW)

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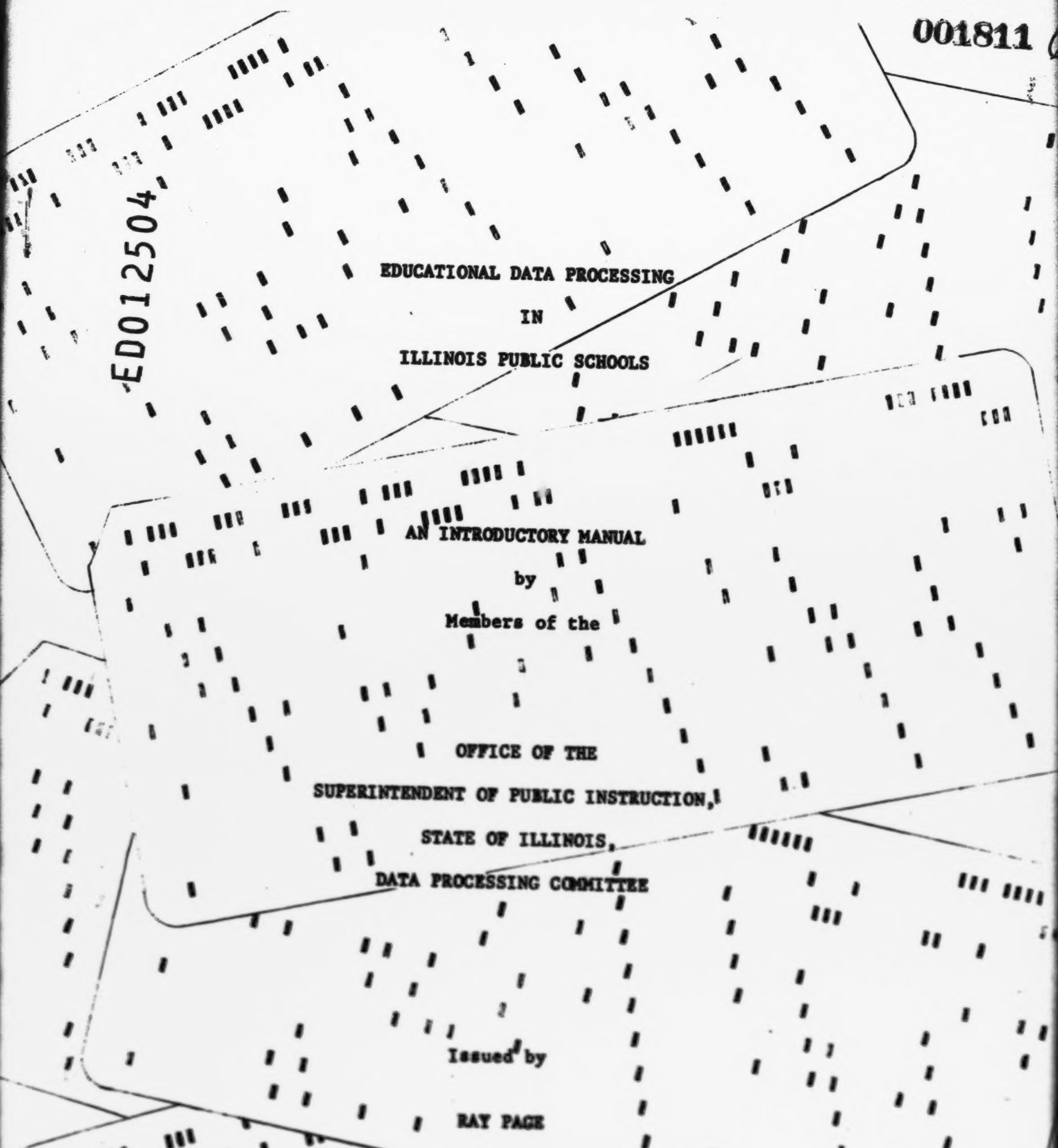

EDUCATIONAL DATA PROCESSING
IN
ILLINOIS PUBLIC SCHOOLS

AN INTRODUCTORY MANUAL

by

Members of the

OFFICE OF THE
SUPERINTENDENT OF PUBLIC INSTRUCTION,
STATE OF ILLINOIS,
DATA PROCESSING COMMITTEE

Issued by

RAY PAGE
SUPERINTENDENT OF PUBLIC INSTRUCTION

State of Illinois
1965

EA 000 636

Circular Series A 168

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FOREWORD

Educational data processing has become a major concern of many administrators in Illinois. Almost half of the students in Illinois' public schools are now served in one or more aspects by data processing methods. It is important that all school administrators be aware of the potential of this important tool.

This introductory manual was produced for the explicit purpose of disseminating information concerning data processing in Illinois public schools to all personnel who should have a vital concern in this area. It provides general survey information as well as specific examples of educational data processing methods. We hope it will stimulate school administrators throughout the State to examine fully the possible applications of data processing methods in their respective schools in order to improve the educational opportunity of every student.

Ray Page
Superintendent of Public Instruction

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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EDITOR'S COMMENTS

One of the many new fields of knowledge is that of Electronic Data Processing. Educators in Illinois are fast recognizing the advantages of using electronic data processing machines for pupil and business accounting purposes in the local school district.

This introductory manual attempts to provide the reader with a general overview of the many aspects of educational data processing in the State of Illinois. Each chapter has been written by school officials who have pioneered educational data systems in this state.

Chapters one through three provide the reader with information relating to educational data processing at the State level. Chapters four through ten furnish a summary of selected school applications.

The last four chapters are of a miscellaneous nature but are concerned with subjects of importance when one is considering entering the field of electronic data processing.

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CHAPTER ONE

ELECTRONIC DATA PROCESSING IN THE PUBLIC SCHOOLS OF ILLINOIS

Electronic data processing is no longer an innovation in the public schools of Illinois. Approximately 43 per cent of the total public school enrollment in Illinois is now served by electronic data processing in one or more applications. In contrast, 93 per cent of the school districts in Illinois have taken no steps to incorporate electronic data processing in the curriculum of their school programs.

The extent of data processing systems and services within the public schools of Illinois was first brought to the attention of school people as a result of a joint statewide survey by the data processing committees of the Superintendent of Public Instruction and the Illinois Association of School Business Officials. The primary purpose of the 1964 spring survey was to determine the degree of utilization of data processing in the schools of Illinois in order to effectively plan a program to assist nonparticipating schools to become acquainted with available services.

To acquire information about the current status of data processing systems and services, the committees constructed an instrument and in February 1964, mailed it to 1444 public school districts in the state. A total of 1030 districts, representing 71.3 per cent of the schools contacted, returned the completed questionnaires to the committee.

Of the group returning the questionnaire, 964 districts (3 per cent) reported that no use was made of electronic data processing systems or services and of this number only 15 reported an interest in further study of the area. Although 66 districts, representing 6.4 per cent of those answering the questionnaire, reported the use of electronic data processing systems and services, 15 of these districts reported that test scoring was the only electronic data processing used by them. Only 51 districts, or 5 per cent of those returning the questionnaire, reported the use of electronic data processing systems or services in more than one operation in their school districts.

It is interesting to note that only 66 school districts, representing 6.5 per cent of the school systems reporting and 4.6 per cent of the total public school districts in Illinois, reported the use of electronic data processing systems or services. These 66 districts service 860,544 children, or approximately 43 per cent of the total public school enrollment in Illinois.

Organization and Enrollment

Analysis of the returned questionnaires indicates that there is an apparent relationship interjacent to the organization, size of school district, and the use of electronic data processing services. Of the 66 districts reporting use of electronic processing, 45 (68 per cent) are duel systems of either K-8 or 9-12 organization (Table 1). Among the 34 districts expressing an interest in electronic data processing, 23 (67 per cent) were either K-8 or 9-12 districts.

TABLE 1

ORGANIZATION OF DISTRICTS USING ELECTRONIC DATA PROCESSING SYSTEMS OR SERVICES

Organization	Number	Per cent of Total
K-8	16	24%
9-12	29	44
K-12	12	18
K-14	4	6
9-14	5	8

Seventeen of the 51 districts using electronic data processing for more than one operation (33 per cent) have enrollments of more than 5000 students while 29 districts (57 per cent) serve the needs of 3000 or more pupils (Table 2).

TABLE 2

ENROLLMENTS OF DISTRICTS USING ELECTRONIC DATA PROCESSING FOR TWO OR MORE OPERATIONS

Enrollment	Number of Districts	Per cent of Total
Above 15,000	4	7.8%
10,000-15,000	5	9.8
5,000-9,999	8	15.7
3,000-4,999	14	27.4
1,000-2,999	19	37.2
Below 1,000	1	1.9

That the use of electronic data processing is not necessarily dependent upon a large pupil population is evident from the fact that one district with fewer than 1000 pupils is now performing 15 seperate operations through the use of data processing equipment.

Operations

The questionnaire sent to the schools of the state contained a listing of 34 common operations now being done on electronic data processing equipment by Illinois school districts. The results of this section of the survey show that, of the 66 schools using EDP, 40 of the districts perform fewer than 10 operations with the equipment. The number of operations, as presented in Table 3, ranges from one (15 districts) to 24 (one district).

TABLE 3

NUMBER OF OPERATIONS PERFORMED BY DISTRICTS USING EDP EQUIPMENT

Number of Operations	Number of Districts
20-24	3
15-19	8
10-14	15
5-9	15
1-4 (Includes test scoring)	25

Of the 34 operations now being performed by districts in the state, three operations are performed by 40 or more districts. An additional four operations are being performed by 30 or more districts. A complete report of the number of districts performing each of the 34 operations is presented in Table 4.

TABLE 4

NUMBER OF DISTRICTS PERFORMING SELECTED OPERATIONS ON EDP EQUIPMENT

Operation	Number of Districts
Grade Reporting	42
Student Scheduling	41
Class Lists	40
Testing	39
Mailing & Addressing	32
Class Rank	31

TABLE 4
(Continued)

Operation	Number of Districts
Failure Lists	30
Attendance	28
Grade Distribution	23
Honors List	21
Student Fees	15
Permanent Records	15
Locker Assignments	13
Daily Absence Lists	11
Payroll	11
Payroll Register	11
Personality Profile	10
Employee W-2 Forms	10
Monthly Budget Report	10
Eligibility Report	9
Accounts Payable	9
Budget Accounting	9
Payroll Journal	8
Annual Budget Report	7
Pension Summary	7
Bus Passes	6
Census	6
Budget Encumbrance	6
Transportation	5

TABLE 4
(Continued)

Operation	Number of Districts
Transcripts	4
Activities Tickets	3
Purchasing	3
Health Records	2
Library Techniques	0

Equipment

Thirty-six of the school districts taking part in the survey reported that they are using a total of 226 electronic data processing machines for the operations being performed in their districts. These machines are housed in the individual districts and are operated by school district personnel. Only ten of these pieces of equipment are owned by the individual districts; the remaining 216 machines are being used by the districts on a rental fee basis. The number of pieces of equipment being used by the 36 schools, ranging from thirty-eight in one district to one in two districts, is presented in Table 5.

TABLE 5

NUMBER OF EDP MACHINES USED BY
THIRTY-SIX REPORTING DISTRICTS

Machines	Number of Schools
38	1
15-20	2

TABLE 5
(Continued)

Machines	Number of Schools
10-14	2
5-9	9
1-4	22

The different types of electronic data processing equipment being used by the thirty-six schools reporting, together with the total number of each being used, are presented in Table 6.

TABLE 6

TYPES OF EDP EQUIPMENT USED BY ILLINOIS SCHOOL DISTRICTS

Equipment	Number of Districts Using	Number of Machines Being Used
Key Punch	34	68
Sorter	34	44
Accounting Machine	24	28
Reproducing Punch	16	18
Test Scoring	13	14
Interpreter	13	14
Collator	11	12
Computer	8	10
Decollator	6	7

TABLE 6
(Continued)

Equipment	Number of Districts Using	Number of Machines Being Used
Burster	5	6
Verifier	3	3
Page Scanner	1	1
Card Reader & Punch	1	1

Summary

The reader will note from the preceding discussion that a selected group of districts in the state have recognized the advantages to be realized through the utilization of electronic data processing equipment and services and have taken significant steps in this area. On the basis of enthusiastic reports from these districts a wide expansion of data processing activity in school districts is anticipated in the near future.

CHAPTER TWO

THE STATE DEPARTMENT AND ELECTRONIC DATA PROCESSING

Electronic data processing is viewed by the state department as an effective means of improving statistical services in the Illinois system of public education. Within the broad limits of this scope of educational data processing, personnel in the Office of the Superintendent of Public Instruction, assisted by specialists in this field from various county offices and school districts throughout the state, strive continually to effectively utilize available time and equipment to achieve an improved statistical treatment of educational data.

State Department Personnel and Equipment

A close look at the extent of personnel and equipment is appropriate in order to properly examine data processing plans at the state department level. In addition to several general supervisory personnel, the personnel of the data processing installation includes the following normal complement by type of position:

Data Processing Supervisor -1
Programmer - 3
Machine Operators - 2
Key Punch Supervisor - 1
Key Punch Operators - 7

These fourteen people perform all data processing operations of the State department of education.

Equipment in the data processing installation includes all basic components necessary to operate an IBM 1401 magnetic tape computer system. In particular, the computer installation is comprised of a basic computer unit with a storage capacity of 8000 characters, four magnetic tape drives, a printer, and a card-read-punch unit. Appropriate peripheral unit record equipment completes the total data processing installation.

Present State Department Operations

Data processing operations in the Office of the Superintendent of Public Instruction assist many departments within the organization. Although officially located in the Division of Finance and Statistics, the data processing division serves as a computational center for departments outside this division. A brief listing of the current data processing activities indicates the scope of work involved:

A. Present Work
   1. Teacher Certificate Program
   2. School Lunch Commodities Allocations
   3. State Aid Claims (Basic and Amended)
   4. Transportation Claims
   5. Annual School District Reports
   6. Teachers Service Records
   7. Fall Housing
   8. Annual Financial Report
   9. Bus Driver Permits
   10. Special Education Reports
   11. Driver Training Reports
   12. OSPI Payroll (Departmental Itemization)
   13. Statistical Reports as Requested

B. Planned Work
   1. Lunch and Milk Claims
   2. OSPI Property Control

3. OSPI Personnel Services Payroll Ledgering

4. County Superintendents Reports

5. Property Accounting - Local School Districts

C. Pilot Studies

1. Data Tele-Processing Project

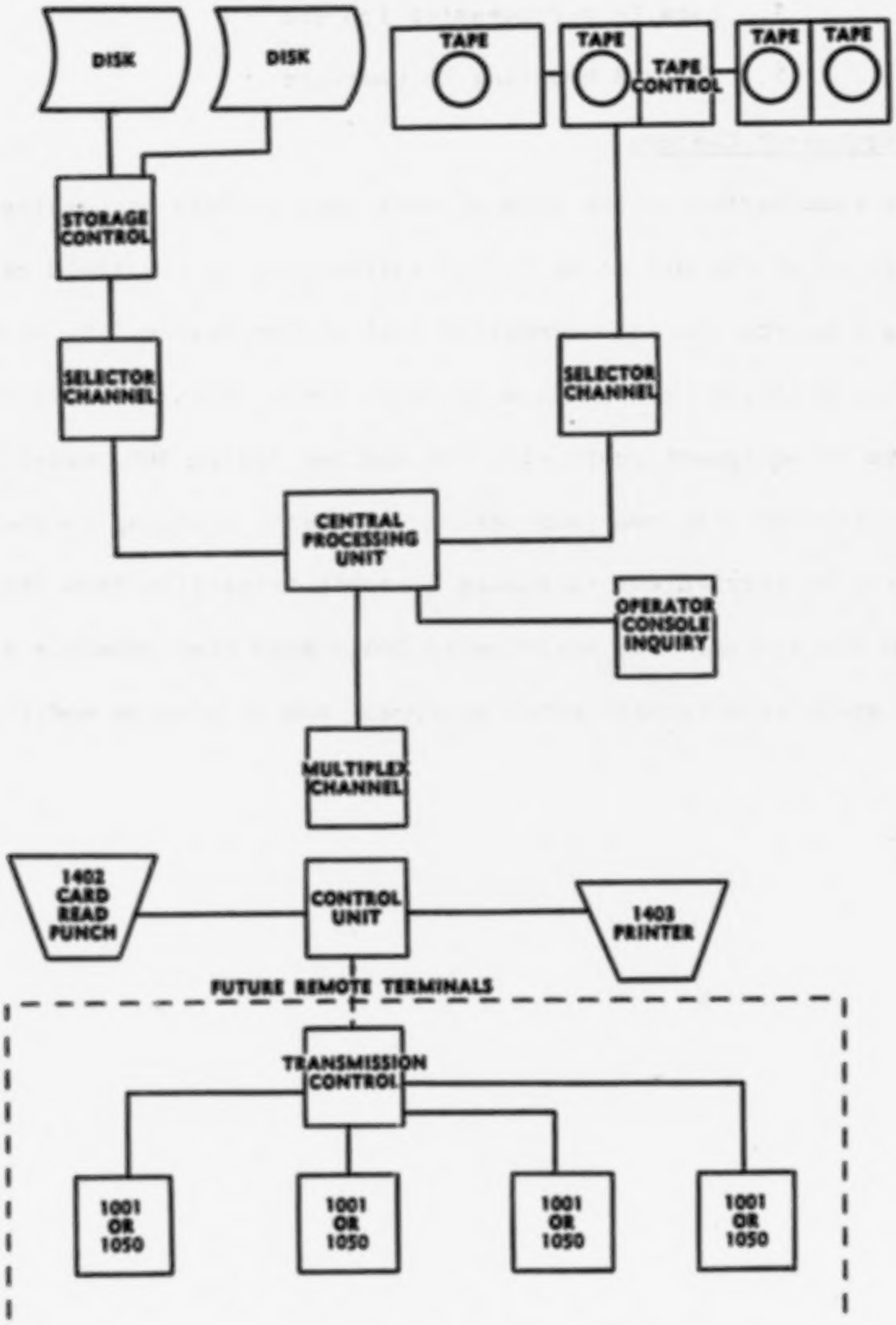
2. Class Scheduling by Computer

Proposed Equipment Changes

An examination of the present work load in data processing and the future potentialities of the Office of Public Instruction in the field of educational data processing supports the recommendation that an IBM System 360, Model E-30 (32K), Computer Installation be installed in July, 1967. The following diagram indicates those units of equipment comprising the desired System 360, Model E-30 (32K).

During the next two year period necessary, training courses and program changes will be carried out to insure a smooth transition from the IBM 1401 system to the IBM 360 system. The anticipated long-range time schedule allows a necessary period of study to determine minor equipment and/or program modification.

PROPOSED STATE DEPARTMENT EQUIPMENT LAYOUT FOR IBM SYSTEM 360

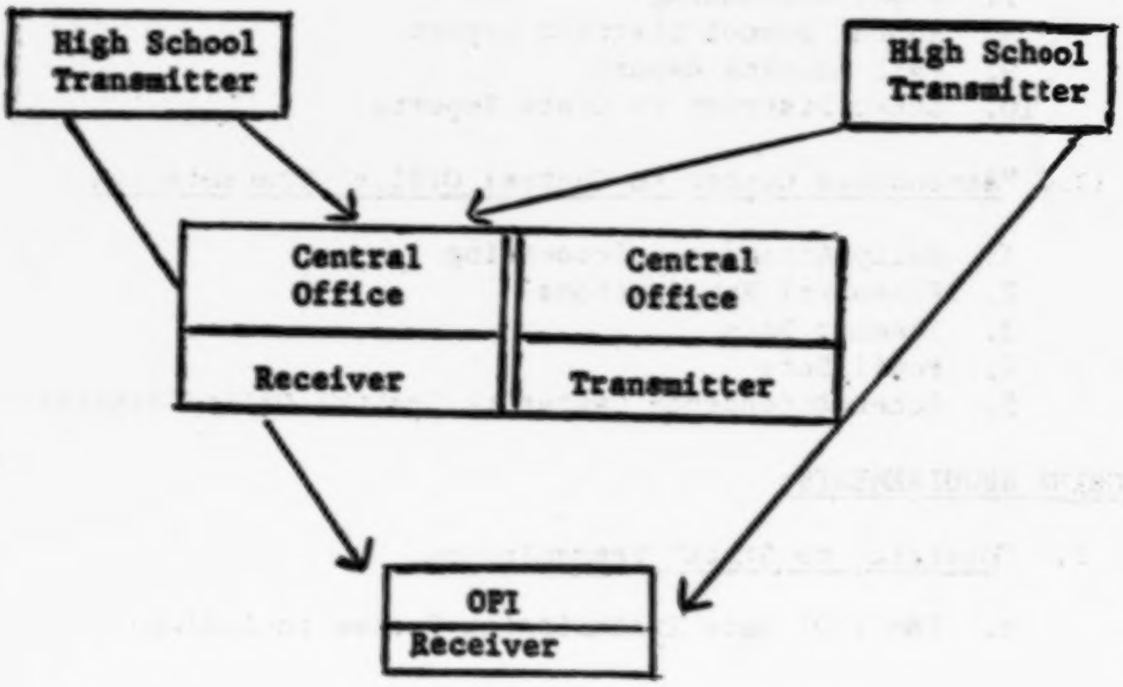

DISK
DISK
TAPE
TAPE
TAPE CONTROL
TAPE
TAPE
STORAGE CONTROL
SELECTOR CHANNEL
SELECTOR CHANNEL
CENTRAL PROCESSING UNIT
OPERATOR CONSOLE INQUIRY
MULTIPLEX CHANNEL
1402 CARD READ PUNCH
CONTROL UNIT
1403 PRINTER
FUTURE REMOTE TERMINALS
TRANSMISSION CONTROL
1001 OR 1050
1001 OR 1050
1001 OR 1050
1001 OR 1050

The Tele-processing Pilot Study Proposal

The following discussion sets forth the basic purposes and requirements for the Tele-Processing Pilot Study established as a joint research project of the Office of Public Instruction, the Decatur Public School System, and the Superintendent of Public Instruction Data Processing Committee.

A. GENERAL DESCRIPTION:

The Tele-Processing Pilot Study was conducted to simulate two basic processes of data collection in the Illinois public school system: (1) the transmission of educational data from a school district to the Office of Public Instruction and (2) the transmission of educational data from an attendance center to a district central office. Necessary tele-processing equipment was installed to simulate both operations. The layout of equipment is portrayed in the following simplified diagram:


High School Transmitter
High School Transmitter
Central Office
Receiver
Central Office
Transmitter
OPI
Receiver

The school district chosen for the installation of this equipment was the Decatur Public School District 61.

Necessary research plans and paper forms were developed by joint action of the staff of the Office of Public Instruction, the staff of the Decatur School System, and members of the State Data Processing Committee. A final report will be submitted by these persons relative to the success of individual projects conducted on the tele-processing equipment, with definite recommendations concerning use of such equipment.

B. PURPOSES:

The following operations were studied to ascertain the practicality of tele-processing transmission in their accomplishments:

I. "District to State" Transmission

1. School Lunch Commodity Program
2. State Aid Attendance Accounting
3. Teacher Service Record Data
4. Transportation Claims
5. Bus Driver Permits
6. Financial Reports
7. Pupil Accounting
8. Annual School District Report
9. Fall Housing Report
10. Other District to State Reports

II. "Attendance Center to Central Office" Transmission

1. Daily Attendance Accounting
2. Financial Requisitions
3. Teacher Data
4. Pupil Data
5. Other Attendance Center to Central Office Reports

C. MACHINE REQUIREMENTS:

I. "District to State" Transmission

a. IBM 1001 Data Transmission System including:

1. **One 1001 Data Transmission Terminal (for installation in a Decatur High School other than the high school of C-1 above.)**

2. **One IBM 24 Card Punch with attached Data Translator (for installation in the Decatur Central Office.)**

CHAPTER THREE

THE SUPERINTENDENT OF PUBLIC INSTRUCTION'S DATA PROCESSING COMMITTEE

The creation of the Superintendent of Public Instruction's Data Processing Committee, normally referred to as the State Data Processing Committee, in January, 1964, added an influential and authoritative group of school business managers and professional data processing personnel to the state department personnel to form a planning group for data processing operations in Illinois Public School Systems. The fifteen members of this committee represent the Champaign, Clinton, Decatur, Rockford, New Trier Township High School, and Northbrook Township High School districts plus representatives of the Cook County Superintendent of Schools, Illinois Universities, and Superintendent of Public Instruction personnel. This committee has very enthusiastically tackled the task of providing leadership for educational data processing in Illinois.

Proposed Committee Functions

The following tasks were delineated during the early planning stages of the committee as worthy of long range attention:

1. The committee shall assist and give direction to any studies desired by the State Department of Public Instruction in the area of data processing.
2. The committee shall continue research in the development of new or better procedures related to the processing of data.
3. The committee shall coordinate these studies and findings with recommendations to the State Department of Public Instruction.

4. The Committee shall encourage and participate in instructional programs, in seminars, etc., in order to inform Illinois school personnel of the processes available when using data processing.
5. The committee shall encourage and develop a roster of programs currently available in Illinois. The list shall include those programs currently in operation, programs scheduled for future availability, and such other pertinent appropriate information.
6. The Committee shall serve to cooperate with any experimental process as recommended and to make the results of such programs available.
7. The Committee shall recommend the up-dating of all reports and procedures whenever seemed desirable or necessary.
8. The Committee shall give leadership in the use of data processing for business, education, and research.

Committee Activities

The activities of this State Data Processing Committee during its first few months of operation consisted of monthly meetings in which various aspects of educational data processing in Illinois were discussed and small group assignments for investigation and reports. The first major task of the committee, beyond general orientation of committee members regarding the extent of data processing in Illinois public schools, was the production of this introductory manual on educational data processing in Illinois. Chapters were developed by individual committee members or small sub-committees of two or three persons interested in specific topics. The manual will be published in 1965.

A second major task now in the developmental stage is the planning and production of data processing workshops for school administrators in Illinois.

The first workshop was held in April, 1965, with a series of workshops planned for the 1965-1966 school year. The workshops are specifically designed to acquaint school personnel with various applications of electronic data processing in school districts.

In addition to these major committee projects, various problems have been undertaken in the areas of financial and student accounting. For example, a specific subcommittee met with members of the auditing division in the Office of the Superintendent of Public Instruction to suggest guidelines for school district attendance reporting. Another committee worked with the state department to ensure adaptability of school district financial accounting procedures to electronic data processing.

CHAPTER FOUR

SCHOOL CENSUS PROCEDURES UTILIZING ELECTRONIC DATA PROCESSING MACHINES

I. INTRODUCTION

The school census is a part of student accounting which provides an important source of data concerning the student and the student's family.

Tuition laws, compulsory attendance statutes, and the requirements of state aid laws are factors which provide additional reasons for conducting a school census.

The manual taking of a school census has often failed to produce satisfactory results because of the school's inability to immediately group, classify, and produce reports in usable form. The sheer weight of the data manipulation results in many days or even months of delay in obtaining needed facts from a manual census. In the majority of school districts, it is axiomatic that the most complete and accurate census is of little or no value unless the data is immediately and continuously available for needed usage. Census information must be not only accurate and timely; it must also be available for use by all concerned.

The utilization of punched card equipment offers an efficient and economical solution to the problem of handling the census data. The census information in the form of punched cards can be sorted, tabulated, re-sorted, and re-tabulated to arrive at any required set of statistics. Not only can basic information be provided at far greater speed than ever before, but it is possible to produce other reports and analyses which are of vital importance to school administrators.

The advantages of machine punched card procedures for handling census data listed below:

1. Results of census made available sooner.
2. Flexibility of the machines permits listings in any desired sequence as well as providing almost unlimited statistical analyses within the scope of the punched data.
3. Machine accuracy in sorting and tabulating.
4. Pin-pointing errors in enumeration.
5. Elimination of errors in data.
6. Use of duplicate files prepared automatically.
7. Substantial cost savings.
8. Available source of data for other student accounting applications.

II. PURPOSE

The general purpose of the school census is to provide information which will be helpful to school officials and others in planning for future years of quality education.

The facts obtained from the census can aid school officials in planning for: (1) teacher requirements, (2) site planning, (3) construction planning, (4) location of boundaries, and (5) special educational needs. A second major for: (1) student scheduling, (2) student attendance accounting, (3) student grade reporting, and (4) assignment of a permanent student indentification number. The establishment of a continuous census over a period of years will be helpful in defining trends in school population which are valuable for long-range educational planning.

Letters to the leaders of various community groups can help pave the way for a school census. Radio, Television, and newspaper releases are very beneficial since the public needs to cooperate fully with the enumerators. Official census badges and letters of introduction from the Superintendent can prove to be very useful in gaining admittance to the home.

The census procedure is the organizational step to be followed in the obtaining, collecting, and assimilating of census data. Specific days may be established for the obtaining of census data. If the period of time is longer than one day, it will be necessary to establish a specific census day. After the enumerators have finished their job, the materials need to be edited for errors and sent to the central collection station for coding, sorting, and delivery to the machine installation for key punching.

It will be necessary for some enumerators to return at a later date to collect data from the homes that were missed in the original census.

After all census data are collected and turned over to the data processing center, the job of key punching begins. Once the data are punched into the cards, they are ready for processing into the desired reports.

The original census data will soon become obsolete unless procedures are established to maintain a "continuous census." This means that information must be received constantly concerning: (1) births, (2) deaths, (3) mobility, in and out, and (4) changes occurring from within, as changes of address, name changes, etc. As such data is received, the census file must have cards added, cards withdrawn, and information in the cards changed.

III. ORGANIZAING FOR THE CENSUS

Organization for the enumeration consists of: (1) the census enumerators, (2) the public, (3) the area to be assessed, (4) the forms and records to be used, and (5) the procedures to be followed.

The census enumerator may be employed by the school district or may be volunteer help. Satisfactory results can be achieved with either of the two types of groups. Proper organization and management, good instruction techniques, and well designed forms are the basic keys to success.

School district boundaries must be accurately and correctly determined. Grid patterns, areas, blocks, or any other natural division of the district can be used to assure the enumerators complete coverage. The mapping plan should be simple to understand, should provide for a location key so that all students can be pinpointed in the district, and should completely encompass the entire district. Area chairmen, block captains and door-to-door enumerators need detailed maps of each of their assignments so as to insure that all areas are covered. A sufficient number of enumerators should be involved so that no one person's duty is too much of a burden.

The Census Questionnaire should be designed carefully and thoroughly so that the information may be relatively easy to place on the form The questions and resulting information should meet all of the immediate needs as well as the needs of the future.

Census enumerators should be required to attend instructional meetings at which time a set of detailed directions can be thoroughly explained to all concerned. Extreme care should be taken to insure that all enumerators follow exact instructions.

IV. AN EXAMPLE

The census recently conducted in Decatur School District 6, Decatur, Illinois, is given as an example. The reader should keep in mind this example is not the only way to conduct a census or that it is the best way but simply an example of how one school district approached the problem.

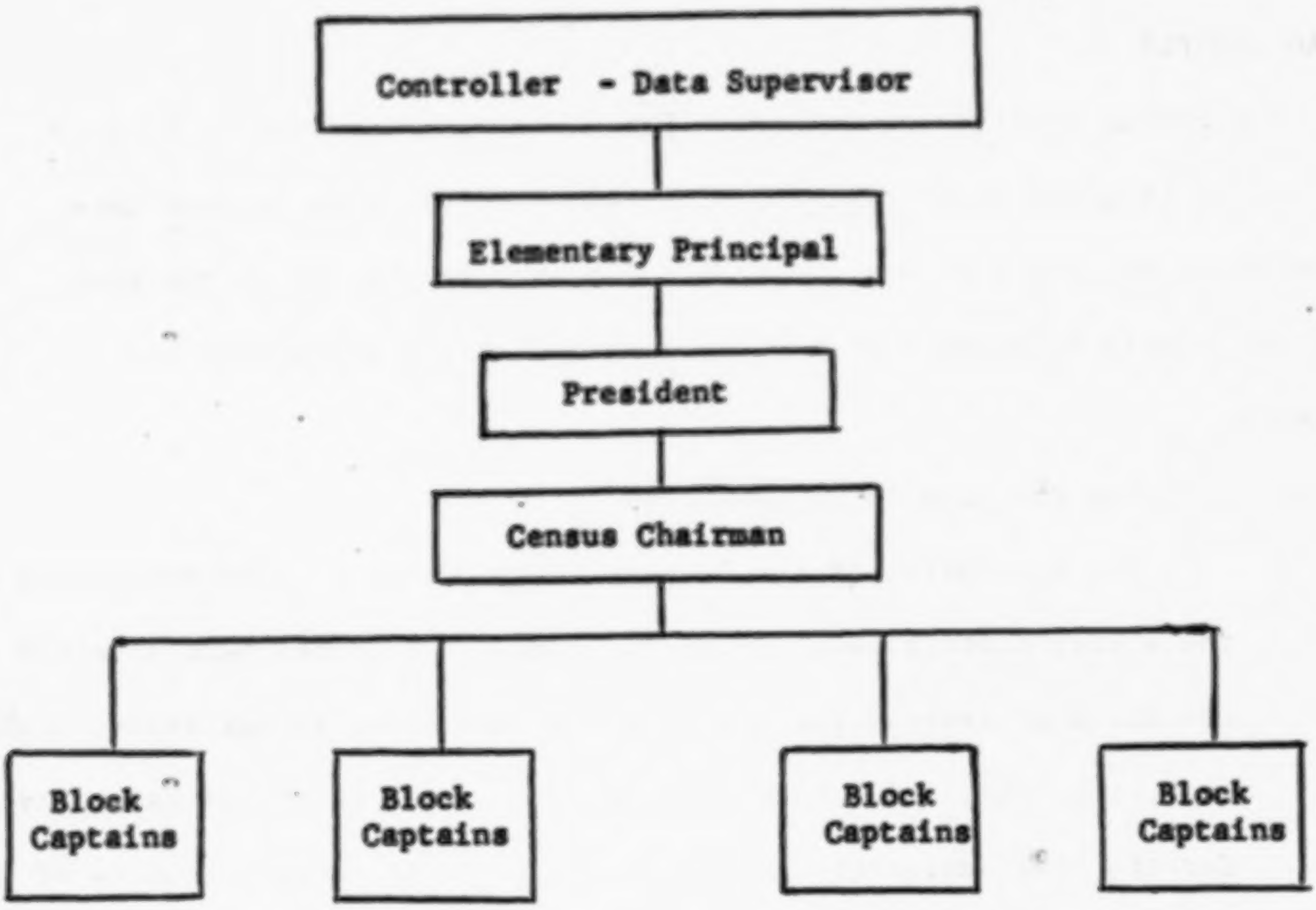
A. Defining the Area to be Enumerated

The boundaries of the Decatur School District were determined and the entire district was divided in areas. The areas were selected on the basis of several factors. Natural divisions as railroads, highways, the lake, and subdivisions on the outskirts of the main city. Certain area designations were chosen with the thought in mind of providing information on population shifts within the district. The areas were then subdivided into Elementary School Districts and each elementary district divided into specific blocks. Thus, the entire school district could be properly covered in the actual census. Detail maps were prepared and given to all persons concerned with the census.

B. Personnel

The central office staff consisted of the controller and the data processing supervisor, who were co-chairmen of the entire census. The PTA president of each elementary district cooperated with the elementary principal in each district. A PTA census chairman was appointed to organize each PTA group. Block captains were obtained to conduct the actual enumeration. A block captain was obtained for each block to be enumerated in the elementary district.

C. Organizational Chart


Controller - Data Supervisor
Elementary Principal
President
Census Chairman
Block Captains
Block Captains
Block Captains
Block Captains

D. Forms

Letters were sent to various group and organizational leaders in the community.

New releases were sent to the Radio, Television, and newspapers.

A large envelope (10" X 13") with metal clasp was used to contain all of the individual block captain's materials. Space on the outside of the envelope was provided to list the following information: area number; school number; school name; book number; the block captain's name, address, and telephone number; and the name of the PTA chairman responsible for editing the completed census records.

The Census Record was the form that the pupil and family information was entered on. Each block captain was given an official census taker's badge. A complete detailed set of directions was given to all persons involved in the enumeration. An official letter of introduction was prepared by the Superintendent and given to each block captain.

Pencils and clipboards were furnished to each Block Captain.

A questionnaire was compiled to be used after the original census for the purpose of providing information on a continuous basis. This questionnaire to be mailed to all persons moving into the Decatur School District or to the parents of newly born children.

E. Instructional and Census Procedures

Orientation meetings were held in each area to be enumerated. Follow-up meetings were scheduled to assure complete coverage. All forms were distributed at the orientation meetings. Specific and detailed directions were given to each block captain.

A full week was selected as the Census Week. The official census day was Friday of the Census Week. All facts collected were entered as of Friday of the Census Week. The block captains were given the option of enumerating any time during the Census Week. The block captains made follow-up visits to all persons not contacted during the official census week. During the Census Week the block captains were given help by special "trouble agents" who traveled to the area or communicated with the block captains by telephone.

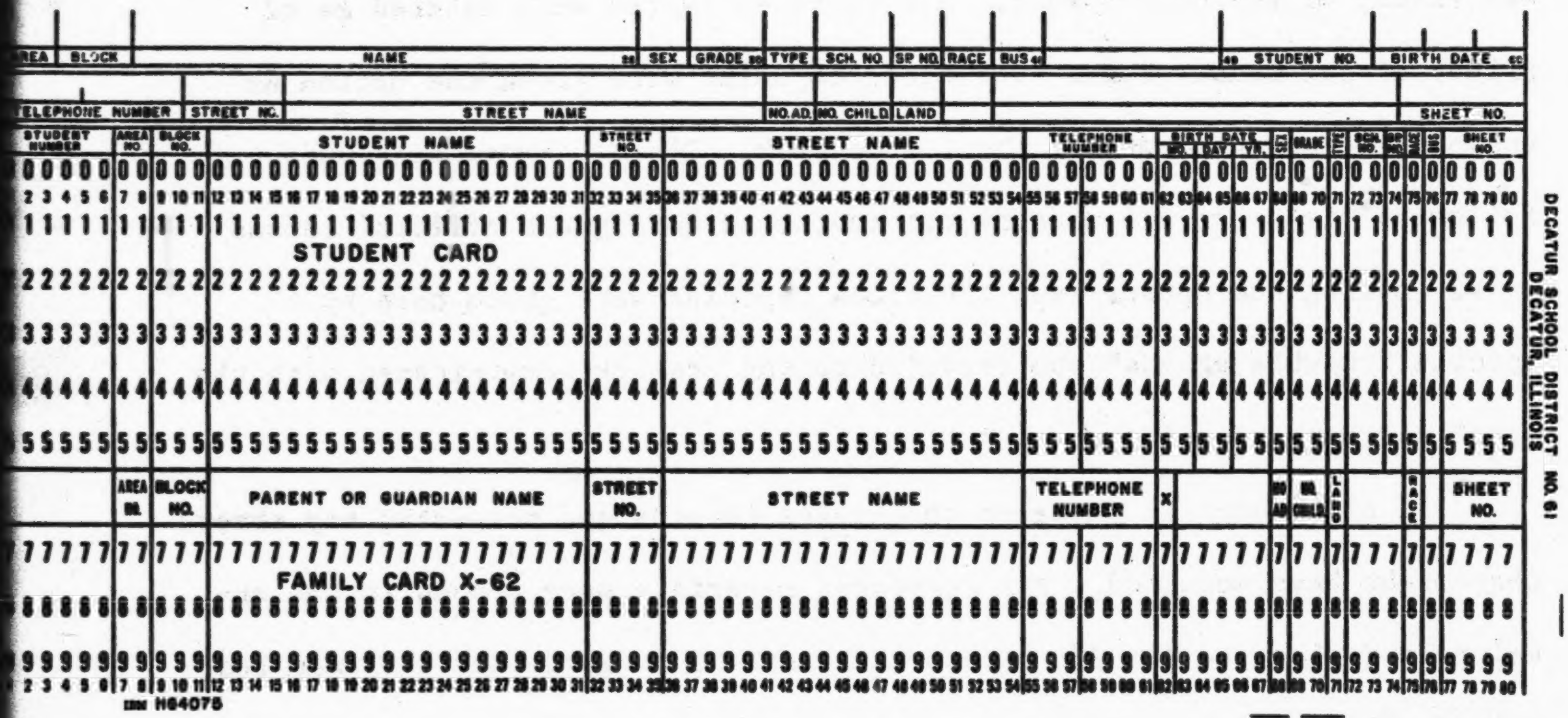
The block captain reviewed the Census Records and corrected any errors that might have occurred. The corrected materials were placed in the envelope and given to the PTA Census chairman. The PTA Census chairman then edited all materials contained in the envelopes and gave them to the elementary school principal. The school principal collected and reviewed the materials and sent them to the Data Processing Center.

Personnel in the data processing center labeled and date stamped all materials. Each individual Census Record was edited, numbered, and sent to the data center for key punching. A second shift of key-punch and key verifier operators was employed to accelerate the key punching activity.

After all Census Reconds were key punched, the punched cards were sorted and tabulated. Many listings were made available to the Superintendent and other school officials through the sorting, re-sorting, and tabulation of the punched cards.

V. SAMPLE FORMS

CENSUS CARD



AREA | BLOCK | NAME | SEX | GRADE | TYPE | SCH. NO. | SP NO. | RACE | BUS | STUDENT NO. | BIRTH DATE

TELEPHONE NUMBER | STREET NO. | STREET NAME | NO. AD. | NO. CHILD | LAND | SHEET NO.

STUDENT NUMBER | AREA NO. | BLOCK NO. | STUDENT NAME | STREET NO. | STREET NAME | TELEPHONE NUMBER | BIRTH DATE MO. DAY YR. | SEX | GRADE | TYPE | SCH. NO. | SP NO. | RACE | BUS | SHEET NO.

STUDENT CARD

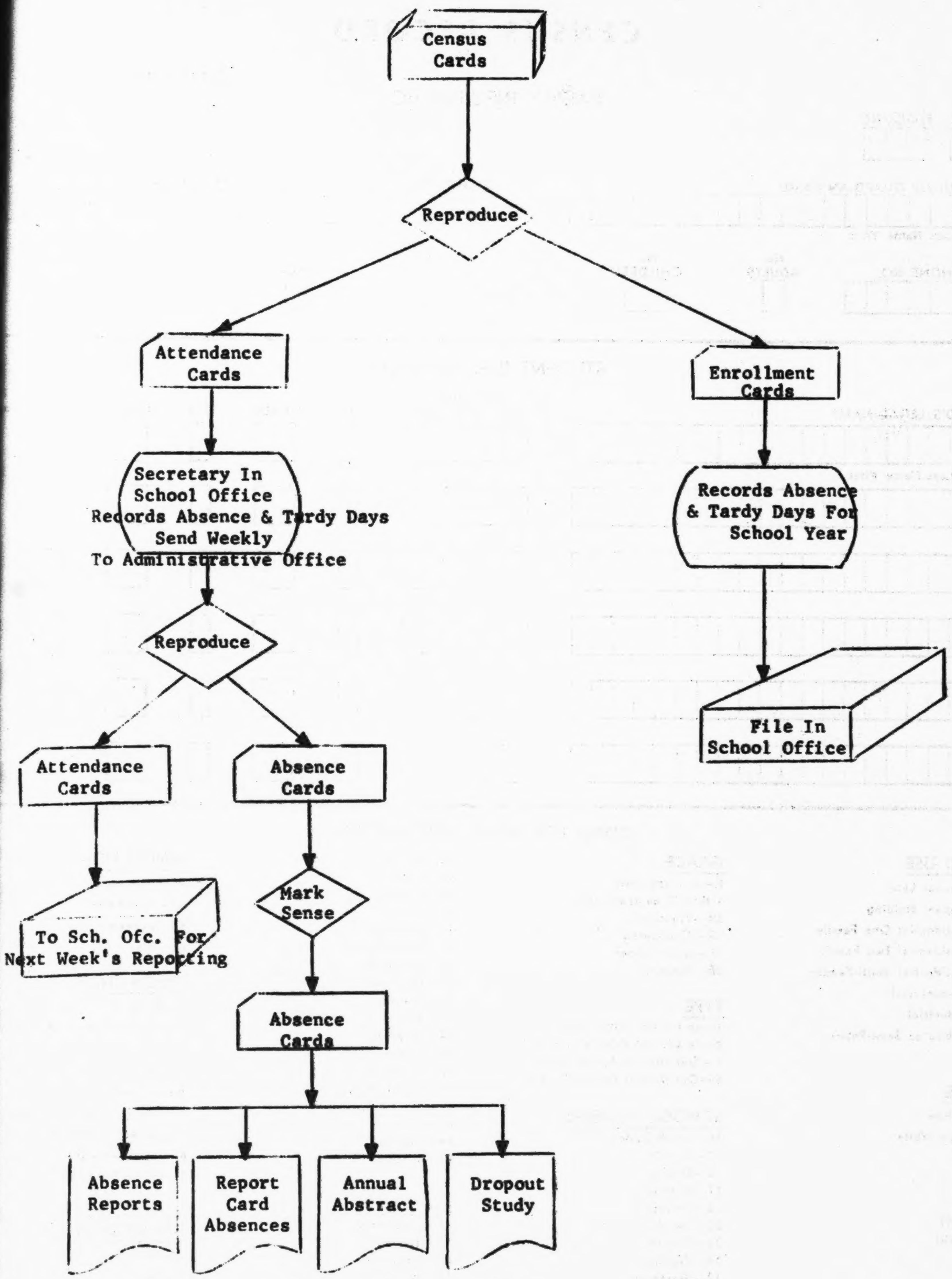
AREA NO. | BLOCK NO. | PARENT OR GUARDIAN NAME | STREET NO. | STREET NAME | TELEPHONE NUMBER | X | NO. AD. | NO. CHILD | LAND | RACE | SHEET NO.

FAMILY CARD X-62

IBM H64075

DECATUR SCHOOL DISTRICT NO. 61
DECATUR, ILLINOIS

CENSUS FLOW CHART


Census Cards
Reproduce
Attendance Cards
Enrollment Cards
Secretary In School Office Records Absence & Tardy Days Send Weekly To Administrative Office
Records Absence & Tardy Days For School Year
Reproduce
File In School Office
Attendance Cards
Absence Cards
To Sch. Ofc. For Next Week's Reporting
Mark Sense
Absence Cards
Absence Reports
Report Card Absences
Annual Abstract
Dropout Study

DPC-6
7-63

DECATUR SCHOOL DISTRICT NO. 61
DECATUR, ILLINOIS

CENSUS RECORD

DATE TAKEN____ ____ ____
Mo. Day Year

FAMILY INFORMATION

AREA ☐☐ BLOCK NO. ☐☐☐

PARENT OR GUARDIAN NAME ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
Print Last Name First

STREET NO. ☐☐☐☐ STREET NAME ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

TELEPHONE NO. ☐☐☐☐☐☐☐ No. ADULTS ☐ No. CHILDREN ☐☐ LAND USE ☐ RACE ☐

STUDENT INFORMATION

CHILD'S LEGAL NAME	BIRTHDATE Mo. Day Year	SEX	GRADE	TYPE	SCHOOL	SPECIAL NEEDS	Transportatio
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Print Last Name First	☐☐☐☐☐☐	☐	☐☐	☐	☐☐	☐	☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐	☐☐☐☐☐☐	☐	☐☐	☐	☐☐	☐	☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐	☐☐☐☐☐☐	☐	☐☐	☐	☐☐	☐	☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐	☐☐☐☐☐☐	☐	☐☐	☐	☐☐	☐	☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐	☐☐☐☐☐☐	☐	☐☐	☐	☐☐	☐	☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐	☐☐☐☐☐☐	☐	☐☐	☐	☐☐	☐	☐

CODES FOR ABOVE INFORMATION

LAND USE
1—Vacant Land
2—Vacant Building
3—Residential One Family
4—Residential Two Family
5—Residential Multi-Family
6—Commercial
7—Industrial
8—Public or Semi-Public

RACE
1—White
2—Non-White

SEX
M—Boy
F—Girl

GRADE
K—Kindergarten
1 thru 12 as applicable
3R—Preschool
4R—Graduated
5R—Quit School
6R—Exempt

TYPE
1—In District Public School
2—In District Private School
3—Out District Public School
4—Out District Private School

SCHOOL NUMBERS
10—Brush College
12—Dennis
15—Durfee
17—Eldorado
18—Enterprise
20—Excelsior South
21—French
24—Garfield
27—Gastman
30—Grant
33—Harris
36—Lincoln
39—Mound
42—Muffley
44—Oak Grove
46—Oakland
48—Oglesby
50—Pershing
52—Pugh
54—Riverside
56—Roach
58—Southeast
60—South Shores
61—Orville Spencer
63—Ullrich
66—Warren
69—Washington

JUNIOR HIGHS
72—Centennial
74—Johns Hill
76—Roosevelt
78—Wilson

SENIOR HIGHS
81—Decatur
82—Eisenhower
84—Lakeview
85—MacArthur

SPECIAL NEEDS
1—Blind
2—Deaf and Hard of Hearing
3—Educable Ment. Handicapped
4—Multiply Handicapped
5—Partially Seeing
6—Physically Handicapped
7—Speech Correction
8—Trainable Ment. Handicapped
9—Home Bound

SCHOOL BUS TRANSPORTATION
1—Yes
2—No

CHAPTER FIVE

DATA PROCESSING IN FINANCIAL ACCOUNTING

I. INTRODUCTION

A. The Accounting Procedure.

The accurate and complete recording of financial data concerning a public school district is required by the school laws of the State of Illinois. Accounting is the central operation of the entire business system for a school district. An accounting system that employs the use of journals for recording original entries, general ledgers for summarization of the journals, and subsidiary ledgers for major operations will provide the information necessary to control and direct the financial operations of the school district.

The financial statements with proper supporting schedules, prepared periodically from the accounts, summarize the detailed data into understandable figures that the school administrator can interpret and use in planning the financial course of the school district.

In this chapter an attempt is made to present the basis for developing a sound accounting system for a school district. No claims will be made that the procedures and practices are the best that can be devised; or that they will meet the requirements of all school districts. Special conditions existing within each district will require certain modifications. However, accepted school accounting procedures have been followed.

B. Fund Accounting

A fund is defined as a sum of money set aside for the purpose of carrying on certain specified activities of a financial nature. Cash, accounts receivable, anticipated revenues, materials, and property are some common resources of a fund. The assets (what a district owns) are reduced by the liabilities (what a district owes). The resulting balance is referred to as the fund balance. The following accounting equation states this basic principle:

Assets = Liabilities + Fund Balance

C. Double Entry Accounting

In Double Entry Accounting, all transactions require both a debit and credit. An example such as the receipt of cash for an accounts receivable would increase (debit) the cash account and decrease (credit) the accounts receivable account. Another example such as the purchase of equipment would increase the asset account and decrease the cash account. The debiting and crediting activity in the double entry system maintains the balance of the fund throughout the accounting period.

D. The General Ledger

The General ledger is the basic book of record in every accounting system. All transactions are posted to this ledger either in detail or by summary postings, which represent detail posting in other records known as journals.

E. The Subsidiary Ledger

The Subsidiary legers are often used in larger districts to provide for all of the many asset and liability accounts. Each subsidiary ledger is reflected in the General Ledger by a single control Account. A large number of entries may be made to each subsidiary ledger, the total of all postings is made in the General Ledger.

F. The Journal

The Journal is used in accounting procedures to group, in a single place, certain types of common transactions. The accounts payable and accounts receivable journals are typical examples in most accounting systems. The Journal entries are referred to as an intermediate accounting system. The accounts affected are posted in detail and the total of all transactions, for a given period of time, is posted to the proper offsetting account.

G. The Illinois Financial Accounting Manual

The individual states have retained the responsibility for public education within their borders. The local school district is the agency designated by the state with the direct responsibility of providing the educational program at the local level. Although the local district has been granted considerable local autonomy, the state has found it necessary to provide direction and guidance for the local districts in matters concerning the financial operations of the district.

The Illinois Financial Accounting Manual as introduced in July, 1961, along with subsequent revisions provides the basic legal and financial framework within which all districts must operate.

The Illinois Financial Manual sets forth the types of funds, the accounting procedures and minimum chart of accounts. Since this manual is available for more detailed study, this writer will not review the accounting procedures in this chapter. The following paragraphs will be directed to the utilization of electronic data processing machines to the accounting procedures as outlined in the Illinois Financial Accounting Manual.

II. PHILOSOPHY AND OBJECTIVES

The development of a sound fiscal philosophy, compatible with the goals of the school district, is essential if one expects the financial affairs of the district to support and maintain the desired educational programs. The statement of philosophy can be used as the guiding factor in the development of financial objectives.

The philosophy and related objectives will stabilize and provide direction for those persons involved in the financial accounting activity.

No doubt, each school district will differ somewhat in its statement of philosophy and in its list of objectives. The following statement concerning philosophy and the related objectives is an example of what one school district has developed along this line.

A. Philosophy

To establish sound business management procedures within the school organization so that the desired educational goals of the district may be achieved. To create and maintain an accounting system consistent with the school laws of the state and modern accounting practices that will provide the Board of Education and School Administrators with the financial data required to achieve the school district's educational objectives.

B. Objectives

To properly account for all money legally belonging to the school district.

To establish appropriate expenditure accounts so that all expenses may be duly and properly recorded.

To develop an accounting system that will be flexible, efficient, and economical to administer.

To provide within the accounting system audit procedures that will enable the administrators to follow authorized budget appropriations.

To develop an accounting system consistent with the procedures of fund accounting as outlined in the "Illinois Financial Accounting Manual for Local School Districts."

The statement of philosophy and objectives becomes a common ground for making decisions and carrying on the daily operations of the department. Periodic evaluation and modification of the philosophy should occur as time and circumstances dictate changes in the direction or goals of the organization.

III. CONVERSION TO MACHINE ACCOUNTING

A. The Basic Accounting System

The Superintendent of Public Instruction has established a standard accounting system in the State of Illinois for local school districts. Basic accounting procedures, forms, reports, minimum chart of accounts, and other related information is given in the Illinois Financial Accounting Manual. A standardized numerical accounting system for all funds has been developed for the sake of consistency and future compilation of statistics and reports. No attempt will be made in this chapter to restate the procedures since the Manual is readily available. However, it should be noted that the standardized numerical system is only a minimum chart which can be expanded to meet the more detailed requirements of school districts.

B. General Conversion Requirements

1. Personnel

As soon as the decision has been reached to convert to electronic data processing, it becomes necessary to acquire the personnel to manage and operate the new machines. The labor market is such that properly trained persons are difficult to obtain. The retraining of present employees under the supervision of a Data Processing Supervisor may be the best solution to the staffing problem. The morale of the present employees and the knowledge that the current staff has concerning the old manual procedures are two advantages to be considered when acquiring staff for the Data Processing Department.

2. Planning

The first point of planning must begin with the evaluation of the old manual system and with a clear understanding of the problem. The conversion to the electronic machine method can be divided into two distinct but related processes: (1) The Developmental Process (2) The Operational Process (see Chart 1).

Another major consideration is the operational date for the initiation of the machine accounting system. The type of machines acquired often dictates the length of preparation and planning time necessary for a smooth and efficient conversion from the manual to the machine method. If the conversion is to be a slow, gradual type of change with but a few of the simpler types of electronic machines, then the required planning time can be but a few months. However, if the transition is to occur at the end of the fiscal period and is to be a complete transition with the use of the more complex and sophisticated machines, then preparation time must begin many months ahead of the operational date. Also, it will be necessary to pilot test the various procedures so that the "bugs" may be cleared out of the new system. It is advisable that parallel operations be carried on for a few accounting months. It may be necessary to parallel several months before all procedures are operating smoothly.

All new operating procedures should be properly documented. General flow charts, detailed operational procedures, and manuals are an absolute necessity for machine accounting.

Planning schedules, charts, and diagrams are quite helpful in programming the conversion period. Preparation and planning should not only consider the immediate needs of the school district but should be concerned with the end results and future expectations. Reports, forms, documents, and statistical requirements on all levels must be considered in the planning activities. Most machine suppliers will provide personnel who will assist in the initial planning for the change to automation.

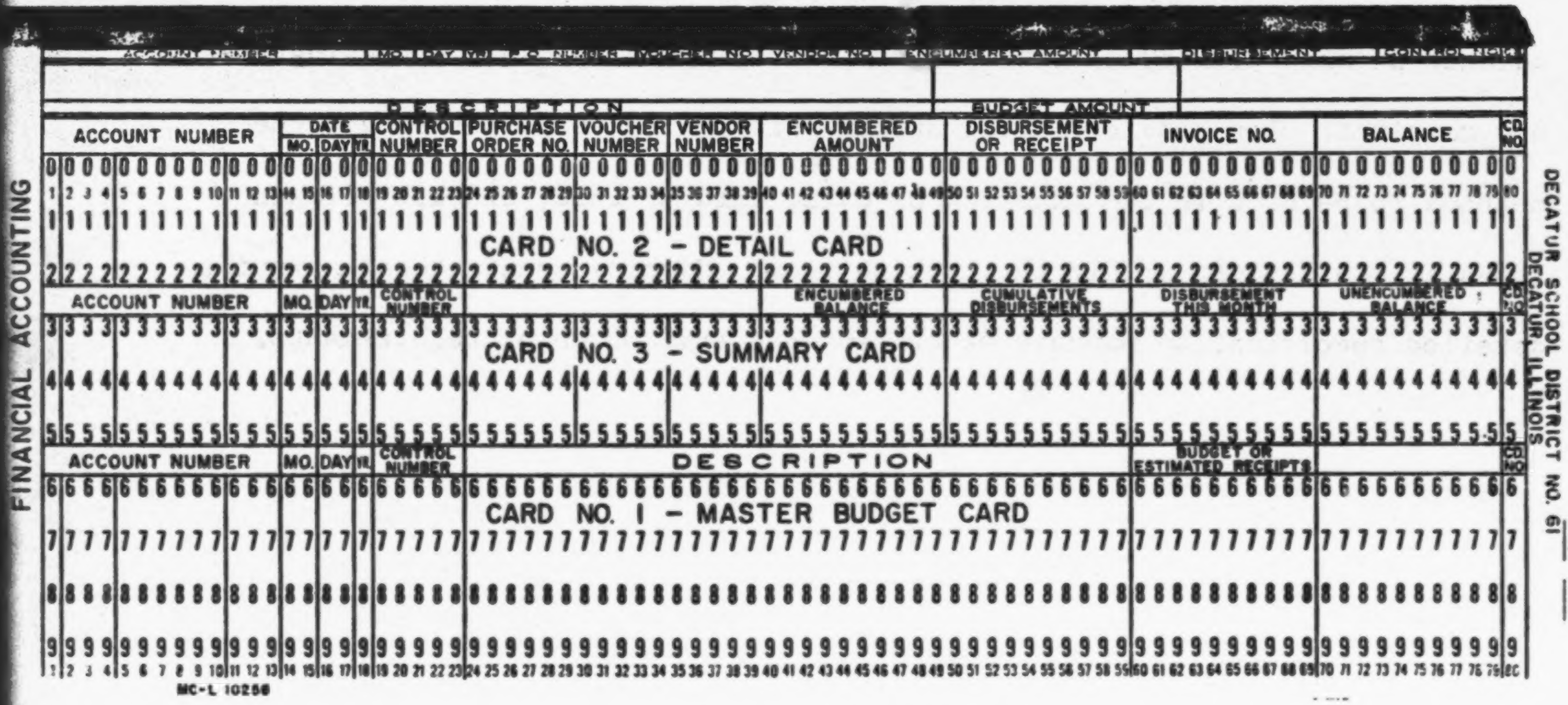
3. Physical Layout

Another important phase of planning that must be considered well in advance of the delivery of the machines is the space needed for housing the new machines. The kind of installation, unit record or computer, and the methods to be used in the handling of data, card or tape, dictate certain types of environment within the machine room. Machine manufacturers provide detailed specification manuals describing the environmental requirements.

IV. RECEIPT ACCOUNTING

General Flow Chart

The following general flow chart is given as an example of the Decatur School District's procedures in accounting for receipts. The procedures as given are in actual operation in an installation utilizing unit record machines and punched cards for the transmission of data. The financial accounting card as shown below will provide the reader with an example of an acceptable card format.



FINANCIAL ACCOUNTING

ACCOUNT NUMBER | MO. | DAY | YR. | P.O. NUMBER | VOUCHER NO. | VENDOR NO. | ENCUMBERED AMOUNT | DISBURSEMENT | CONTROL NO.

DESCRIPTION | BUDGET AMOUNT

CARD NO. 2 - DETAIL CARD

ACCOUNT NUMBER | DATE MO. DAY YR. | CONTROL NUMBER | PURCHASE ORDER NO. | VOUCHER NUMBER | VENDOR NUMBER | ENCUMBERED AMOUNT | DISBURSEMENT OR RECEIPT | INVOICE NO. | BALANCE | CD. NO.

CARD NO. 3 - SUMMARY CARD

ACCOUNT NUMBER | MO. | DAY | YR. | CONTROL NUMBER | ENCUMBERED BALANCE | CUMULATIVE DISBURSEMENTS | DISBURSEMENT THIS MONTH | UNENCUMBERED BALANCE | CD. NO.

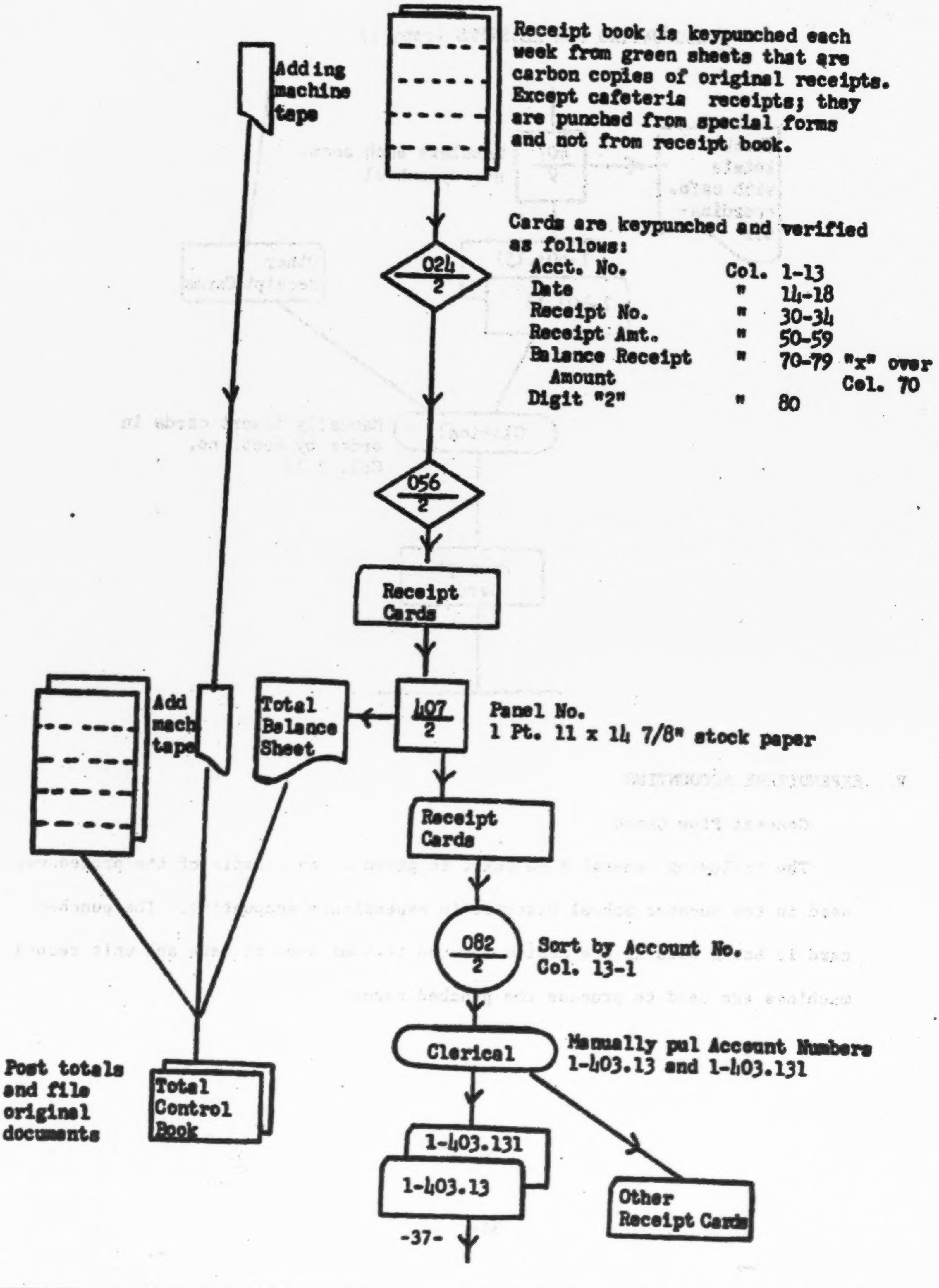
CARD NO. 1 - MASTER BUDGET CARD

ACCOUNT NUMBER | MO. | DAY | YR. | CONTROL NUMBER | DESCRIPTION | BUDGET OR ESTIMATED RECEIPTS | CD. NO.

DECATUR SCHOOL DISTRICT NO. 61
DECATUR, ILLINOIS

MC-L 10250

ACCOUNTING FOR RECEIPTS


Adding machine tape
024 / 2
056 / 2
Receipt Cards
407 / 2
Add mach tape
Total Balance Sheet
Receipt Cards
082 / 2
Clerical
Total Control Book
1-403.131
1-403.13
Other Receipt Cards

Receipt book is keypunched each week from green sheets that are carbon copies of original receipts. Except cafeteria receipts; they are punched from special forms and not from receipt book.

Cards are keypunched and verified as follows:

Acct. No.	Col. 1-13	
Date	" 14-18	
Receipt No.	" 30-34	
Receipt Amt.	" 50-59	
Balance Receipt Amount	" 70-79	"x" over Col. 70
Digit "2"	" 80	

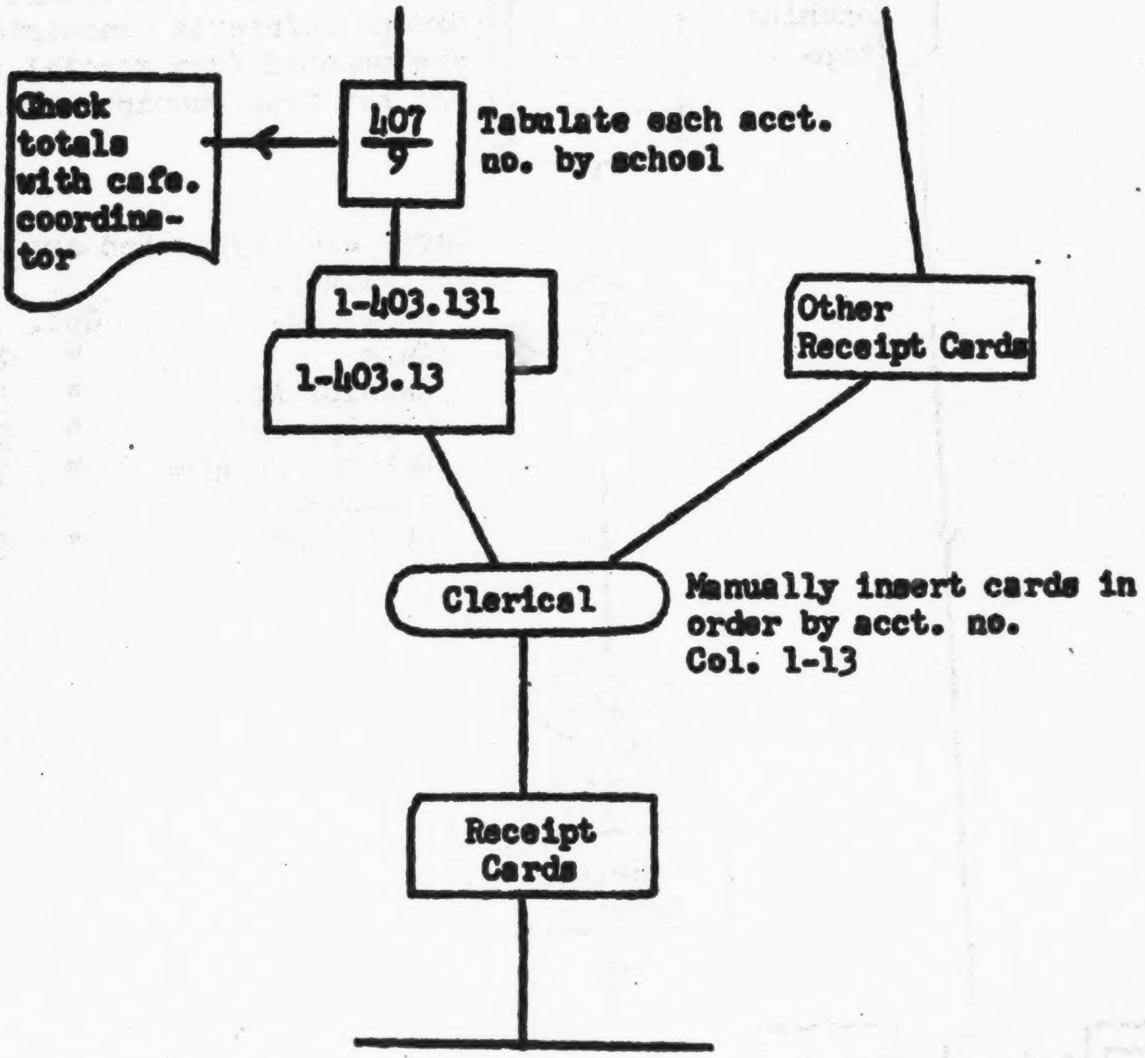
Panel No.
1 Pt. 11 x 14 7/8" stock paper

Sort by Account No.
Col. 13-1

Manually pul Account Numbers 1-403.13 and 1-403.131

Post totals and file original documents

ACCOUNTING FOR RECEIPTS (cont'd)

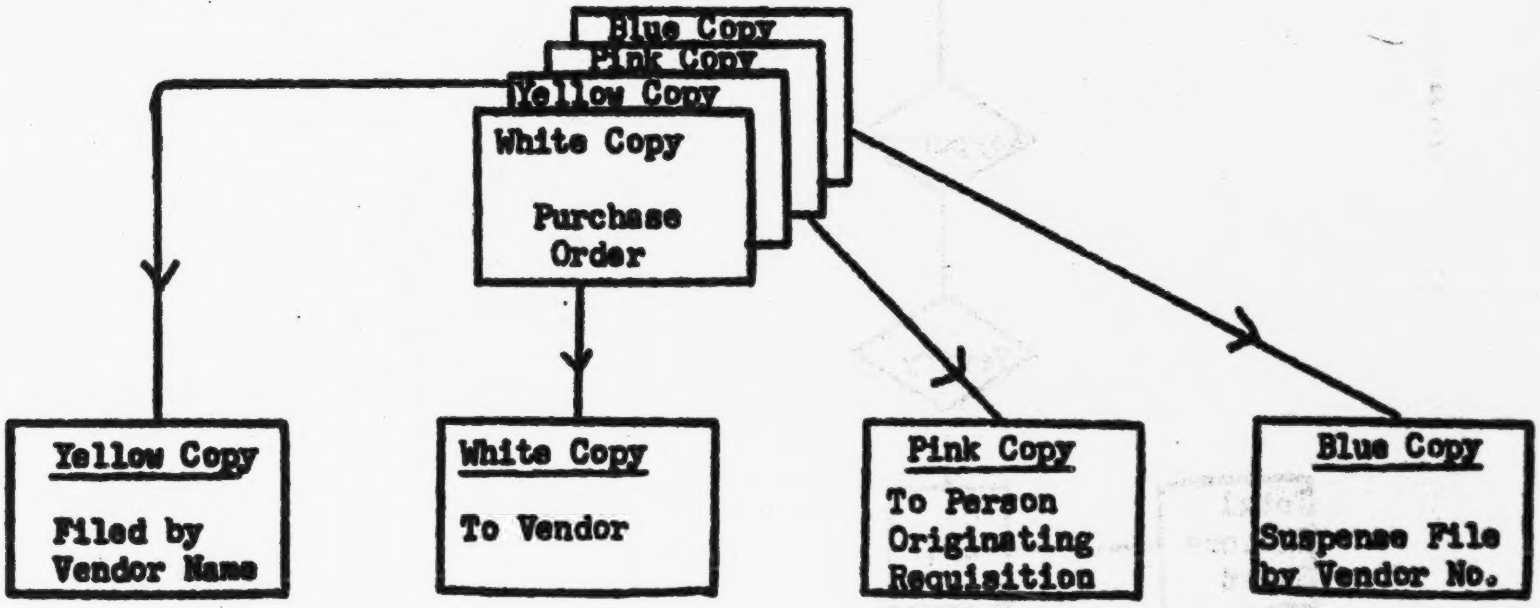

Check totals with cafe. coordinator
407
9
Tabulate each acct. no. by school
1-403.131
1-403.13
Other Receipt Cards
Clerical
Manually insert cards in order by acct. no. Col. 1-13
Receipt Cards

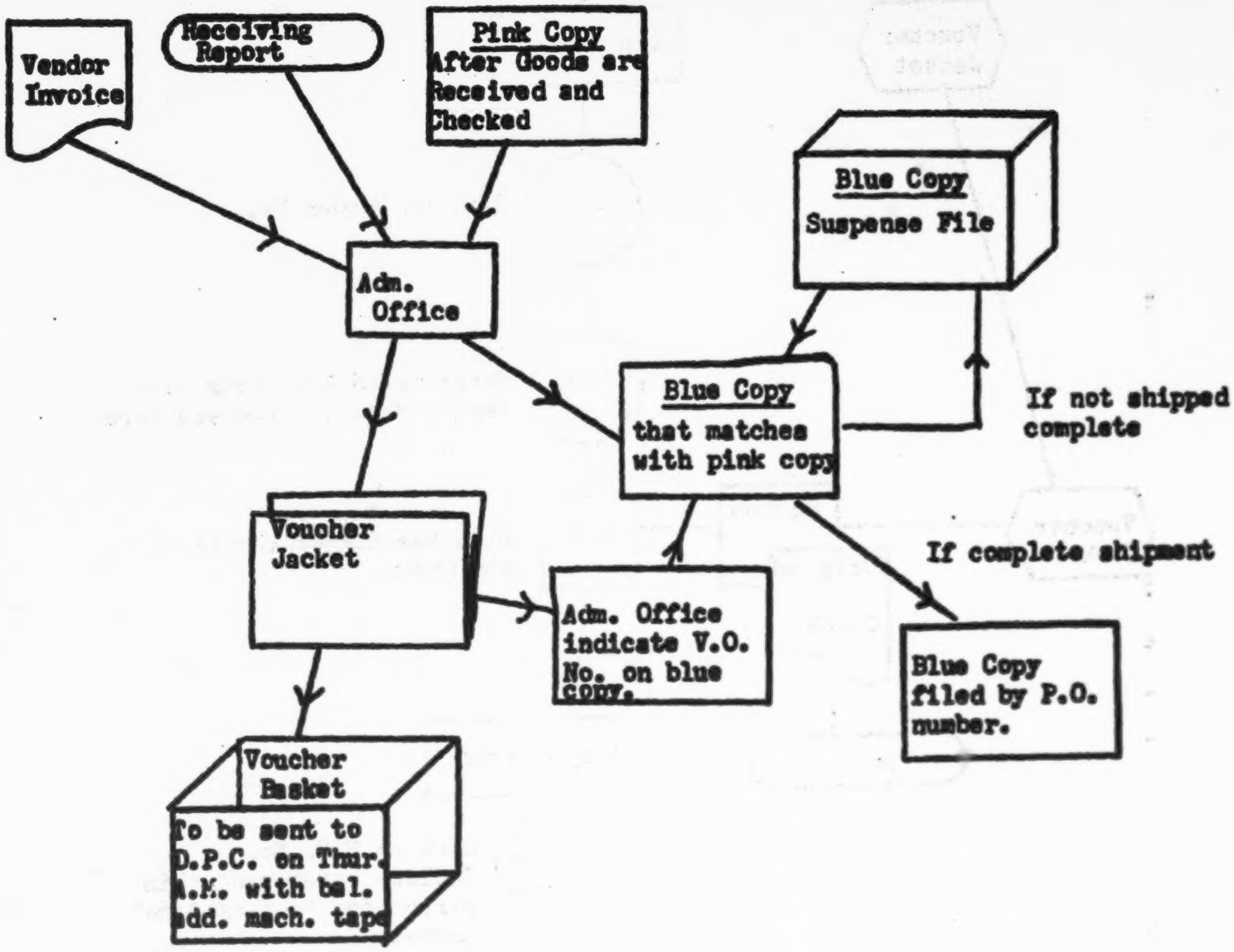
V. EXPENDITURE ACCOUNTING

General Flow Chart

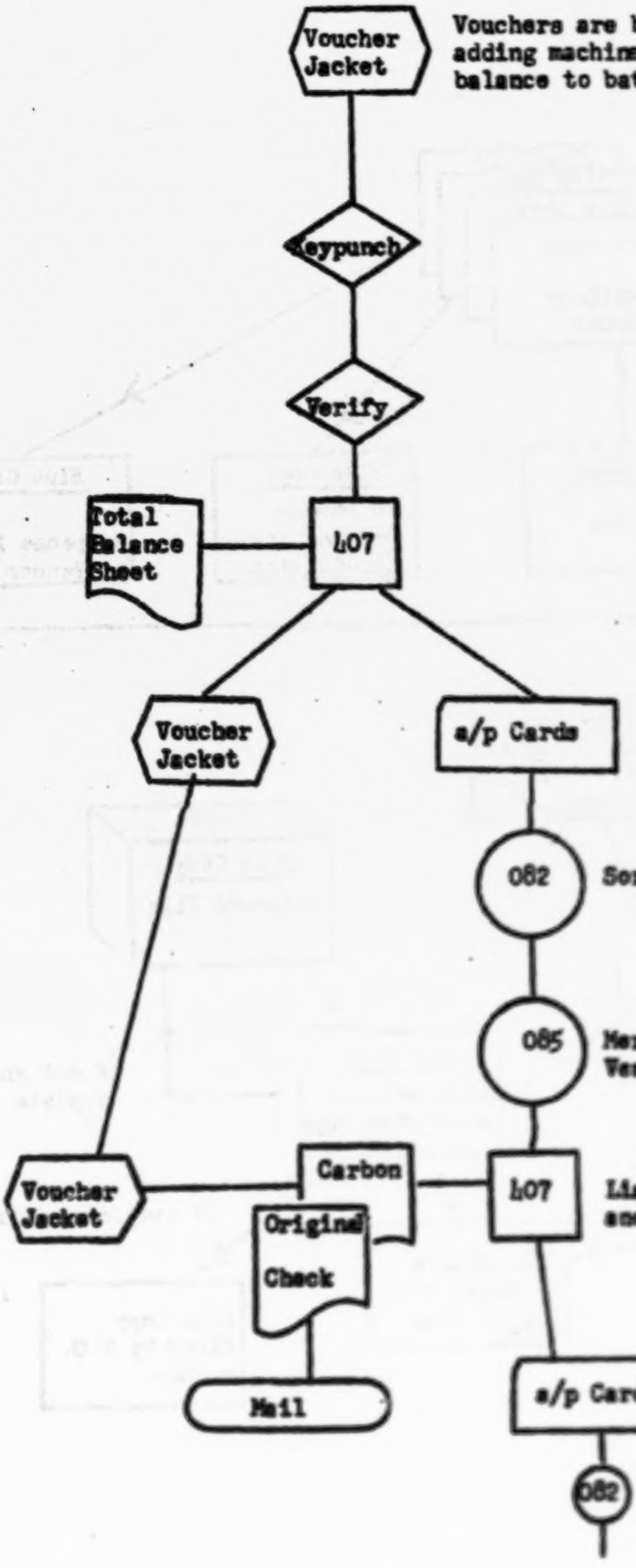
The following General Flow Chart is given as an example of the procedures used in the Decatur School District in expenditure accounting. The punched card is being used as the medium for the transmission of data and unit record machines are used to process the punched cards.

ACCOUNTING FOR DISBURSEMENTS


Blue Copy
Pink Copy
Yellow Copy
White Copy
Purchase Order
Yellow Copy
Filed by Vendor Name
White Copy
To Vendor
Pink Copy
To Person Originating Requisition
Blue Copy
Suspense File by Vendor No.


Vendor Invoice
Receiving Report
Pink Copy
After Goods are Received and Checked
Adm. Office
Blue Copy
Suspense File
Blue Copy
that matches with pink copy
If not shipped complete
If complete shipment
Voucher Jacket
Adm. Office indicate V.O. No. on blue copy.
Blue Copy filed by P.O. number.
Voucher Basket
To be sent to D.P.C. on Thur. A.M. with bal. add. mach. tape

ACCOUNTING FOR DISBURSEMENTS (cont'd)


Voucher Jacket
Keypunch
Verify
Total Balance Sheet
407
Voucher Jacket
a/p Cards
082
085
Voucher Jacket
Carbon
Original Check
407
Mail
a/p Cards
082

Vouchers are batched with adding machine tape to balance to batch total.

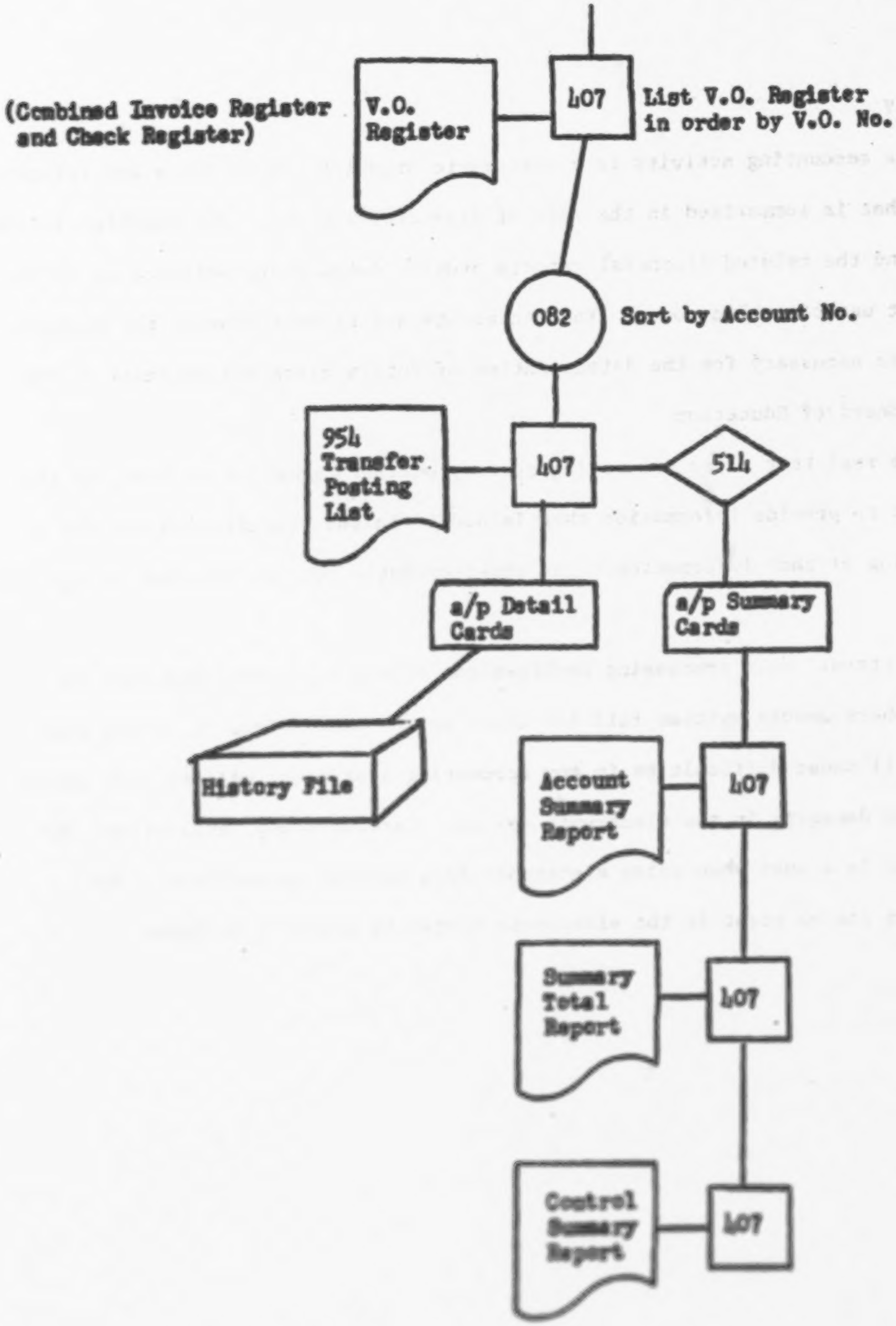
Sort on Vendor No.

Merge match A/p cards with Vendor Name and Address cards.

List Remittance Advice and Check.

Sort on V.O. No. Include cards used this period for "out-of-line" payments.

ACCOUNTING FOR DISBURSEMENTS (cont'd)


(Combined Invoice Register and Check Register)
V.O. Register
407
List V.O. Register in order by V.O. No.
082
Sort by Account No.
954 Transfer Posting List
407
514
a/p Detail Cards
a/p Summary Cards
History File
Account Summary Report
407
Summary Total Report
407
Control Summary Report
407

VI. SUMMARY

The accounting activity is a systematic organization of facts and information that is summarized in the form of financial reports. The detailed information and the related financial reports provide documentary evidence as to the correct use of public money. The statements and reports provide the historical data necessary for the determination of future plans and policies by the local Board of Education.

The real test of an accounting system, whether manual or machine, is the ability to provide information that is needed in the organization and the supplying of that information in an understandable form at the most economical cost.

Electronic data processing machines can effectively meet this test in areas where manual systems fall far short of the mark. Poor or little planning will cause difficulties in any accounting system but will be more noticeable and damaging in the electronic system. Careful study, evaluation, and planning is a must when using electronic data processing machines. The benefits can be great if the electronic system is properly designed.

CHAPTER SIX

STUDENT ATTENDANCE ACCOUNTING

I. INTRODUCTION

Student accounting is an area of natural adaption to electronic data processing. The daily need for student accounting warrants its use due to the large volume of activity. The ease of pupil identification, repetitive information, and quantity of transactions has prompted many school districts to consider the student accounting area as the first to adapt to the electronic data processing method.

The prime function of the school is the education of the pupils. The utilization of electronic data processing machines in the student accounting field has done much to relieve teachers and administrators of many clerical and noneducational tasks. Another factor to consider is the waste of instruction time caused by delay in much needed information. A well defined and properly organized student accounting data processing system can reduce this loss of crucial instruction time.

Objectives

1. To develop and identify a system of student accounting which will reduce clerical and noninstructional tasks for the instructional staff.

2. To provide a system of records approved by the auditors.

3. To provide a system which will provide an immediate report for each attendance center and subsequent reports for the school district.

4. To provide a system which will produce all the data required for the A.D.A. report.

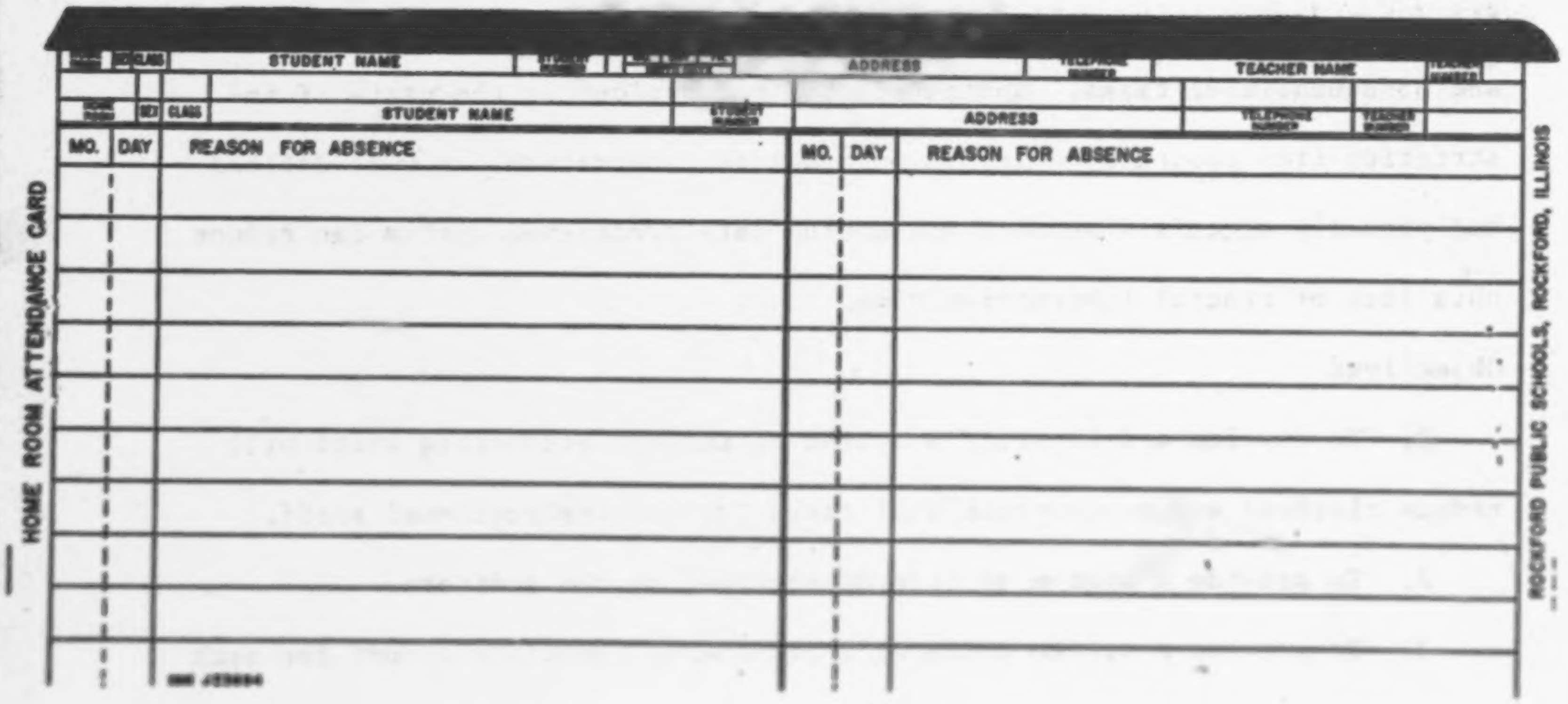
5. To provide a system of records which can be used to project the future enrollments, building requirements, staff needs, etc.

II. SCHOOL ATTENDANCE APPLICATION

Daily attendance is taken during the Home Room meeting (prior to first period) each day. This is accomplished by using a single master Home Room Attendance Card reproduced prior to the beginning of the semester from the Student Master card. This card contains information pertinent to the student- e.g. name, student number, home room telephone, (refer card, Sample 1).

Sample 1

Attendance Card



HOME ROOM ATTENDANCE CARD

HOME ROOM	SEX	CLASS	STUDENT NAME	STUDENT NUMBER	ADDRESS	TELEPHONE NUMBER	TEACHER NUMBER

MO.	DAY	REASON FOR ABSENCE	MO.	DAY	REASON FOR ABSENCE

ROCKFORD PUBLIC SCHOOLS, ROCKFORD, ILLINOIS

The Home Room teacher, after taking daily attendance, places the cards of those students who are absent in a pre-designated place where they are picked up by hall monitors. The absentee cards are taken to the school's data processing office where, through the use of a sorter, they are classified by name and sex.

The sorted cards are then given to the attendance clerk who types a master ditto of absentee students. Copies are then run off and distributed to each teacher as soon as possible.

Sample 2

Absentee Roster

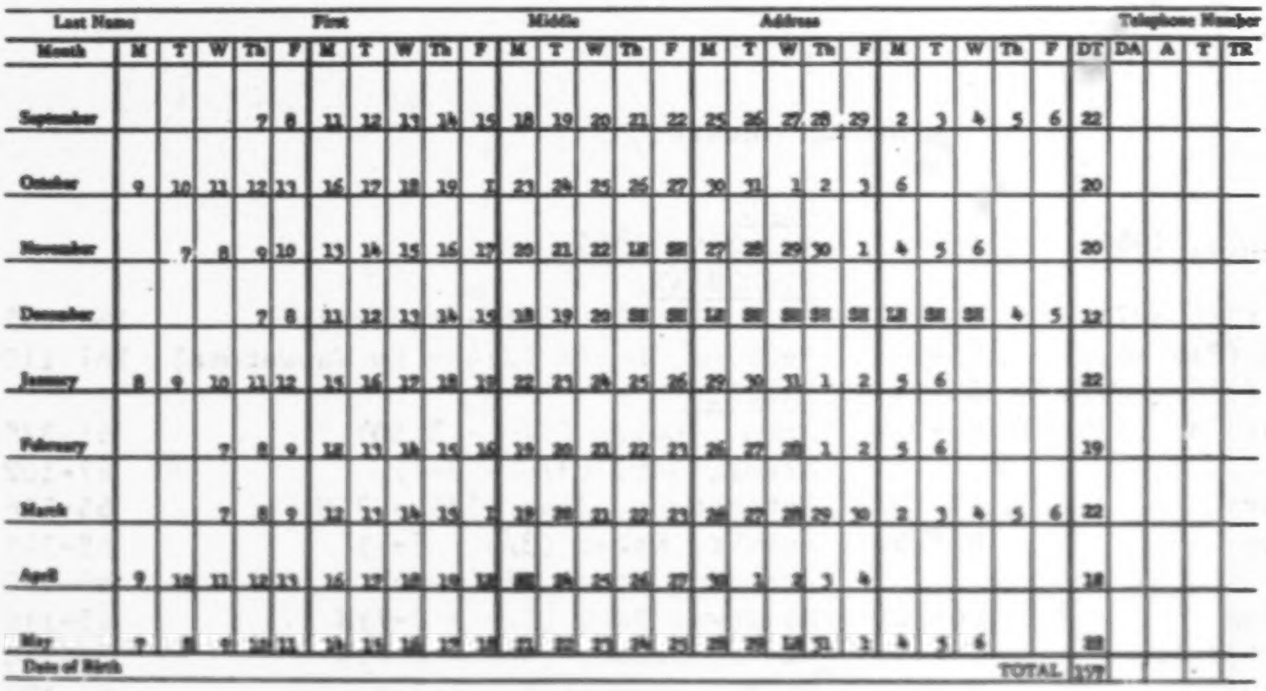
BOYS	
Friday, March 6, 1964	
EXCUSED	
Duke, Jerry (3/6 - 7)	65-278
Forbes, Bill (3/6 -6,7)	65-141
Morgan, Tom (3/6 - 4-7)	65-141
Nelson, Steven M. (3/6 -3)	67-054
SUSPENDED	
Collalte, Gary	67-107
Cook, Lee Roy	67-154
ABSENCE	
Allen, William	66-121
Anderson, Chris A.	65-142
Atkinson, David	66-121
Baney, Carl	66-279
Baxter, Charles	67-290
Beliveau, Steven	65-139
Birkholtz, Neil	67-152
Breit, James	67-147
Brenneman, Thomas	65-141
Brown, Clarence Wm.	66-143
Brown, David	67-046
Burzell, Cameron	67-295
Carlson, Bradley J.	66-279
Carlson, Lavon	66-292
Carus, William	65-141
Clark, Leward	64-291
Dahlgren, Kenneth	66-109
Eberts, Robert	65-141
Emery, Michael	66-296
Erickson, William E.	66-279
Ferguson, Michael	66-043

GIRLS	
March 6, 1964	
WITHDRAWN	
Hale, Pamela (3/5 - to East)	T66-292
Pearson, Lucia (3/4 - to Wauwatosa)	B67-110
EXCUSED	
Amans, Lolly (3/6 - 3:10)	65-278
Arenz, Gail (3/6 - 3-7)	67-102
Fagerstrom, Joan (3/4 - 7)N	65-136
Foster, Karen (3/6 - 6-7)	65-149
Johnson, Ellen (3/6 - 6)	65-150
Meadows, Barb (3/4 - 2-7)N	65-116
Meyer, Debbie (3/4 - 2-7)N	67-154
Miller, Pam (3/4 - 5-7)N	67-102
Snoy, Becky (3/4 - 12:00-7)N	67-154
Steadman, Cindy (3/6 - 3-4)	66-109
Thorsen, Debbie (3/6 -3)	67-110
TARDY	
Atkins, Deborah	67-045
ABSENCE	
Ahlstrand, Susan	64-138
Ahmer, Ellyn	67-283
Armour, Carolyn	66-286
Armour, Joan	64-120
Armstrong, Evelyn	67-283
Atkinson, Linda	67-045
Baarstad, Linda	66-298
Bailey, Virginia	67-283
Bartholomee, Barbara	66-286
Beaman, Jackie	67-283
Beavers, Sharon	67-145
Birkett, Jeanne	67-046

The attendance clerk can, from her copy of absentees, make daily calls (phone number is included on list) to the student's home. The attendance clerk writes on the home room attendance card in specified alloted areas, the day's date, reason for absence, etc.. The attendance clerk also notes absences on a master calendar card for each student.

Sample 3

Master Calendar Card



Last Name						First					Middle							Address												Telephone Number
Month	M	T	W	Th	F	M	T	W	Th	F	M	T	W	Th	F	M	T	W	Th	F	M	T	W	Th	F	DT	DA	A	T	TR
September				7	8	11	12	13	14	15	18	19	20	21	22	25	26	27	28	29	2	3	4	5	6	22				
October	9	10	11	12	13	16	17	18	19	I	23	24	25	26	27	30	31	1	2	3	6					20				
November		7	8	9	10	13	14	15	16	17	20	21	22	[illegible]	[illegible]	27	28	29	30	1	4	5	6			20				
December				7	8	11	12	13	14	15	18	19	20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	5	12				
January	8	9	10	11	12	15	16	17	18	19	22	23	24	25	26	29	30	31	1	2	5	6				22				
February			7	8	9	12	13	14	15	16	19	20	21	22	23	26	27	28	1	2	5	6				19				
March			7	8	9	12	13	14	15	I	19	20	21	22	23	26	27	28	29	30	2	3	4	5	6	22				
April	9	10	11	12	13	16	17	18	19	[illegible]	[illegible]	24	25	26	27	30	1	2	3	4						18				
May	7	8	9	10	11	14	15	16	17	18	21	22	23	24	25	28	29	[illegible]	31	1	4	5	6			[illegible]				
Date of Birth																									TOTAL	179				

This card is also reproduced from the student master card and is used for the full school year. Each month each card is reviewed and absences, full days, and half days, are counted. An attendance report is then sent to the administration office attendance clerk who further compiles the information for state reports.

The absentee cards are returned to the data processing office where they are re-sorted into home room order and placed in teacher mail boxes for the next day's activity.

This form of daily attendance, although somewhat involved and time consuming, is effective and quite accurate. We achieve two basic aims: 1) to develop quickly daily absentee lists; and 2) to maintain a constant daily attendance record of each student in each school.

An alternate solution to the problem would be to centralize one office fed by many individual schools. This office would generate the daily lists from attendance cards in much the same manner as previously described. Instead of individual schools. Instead of individual clerks typing ditto masters, a ditto master per school could be generated directly from the card, and copies distributed immediately to the schools.

Because, however, of our large geographical area, the Rockford School System, at this time, finds the transportation problem too great. Possibly a fast means of transportation between the central data processing office to the schools could be the answer.

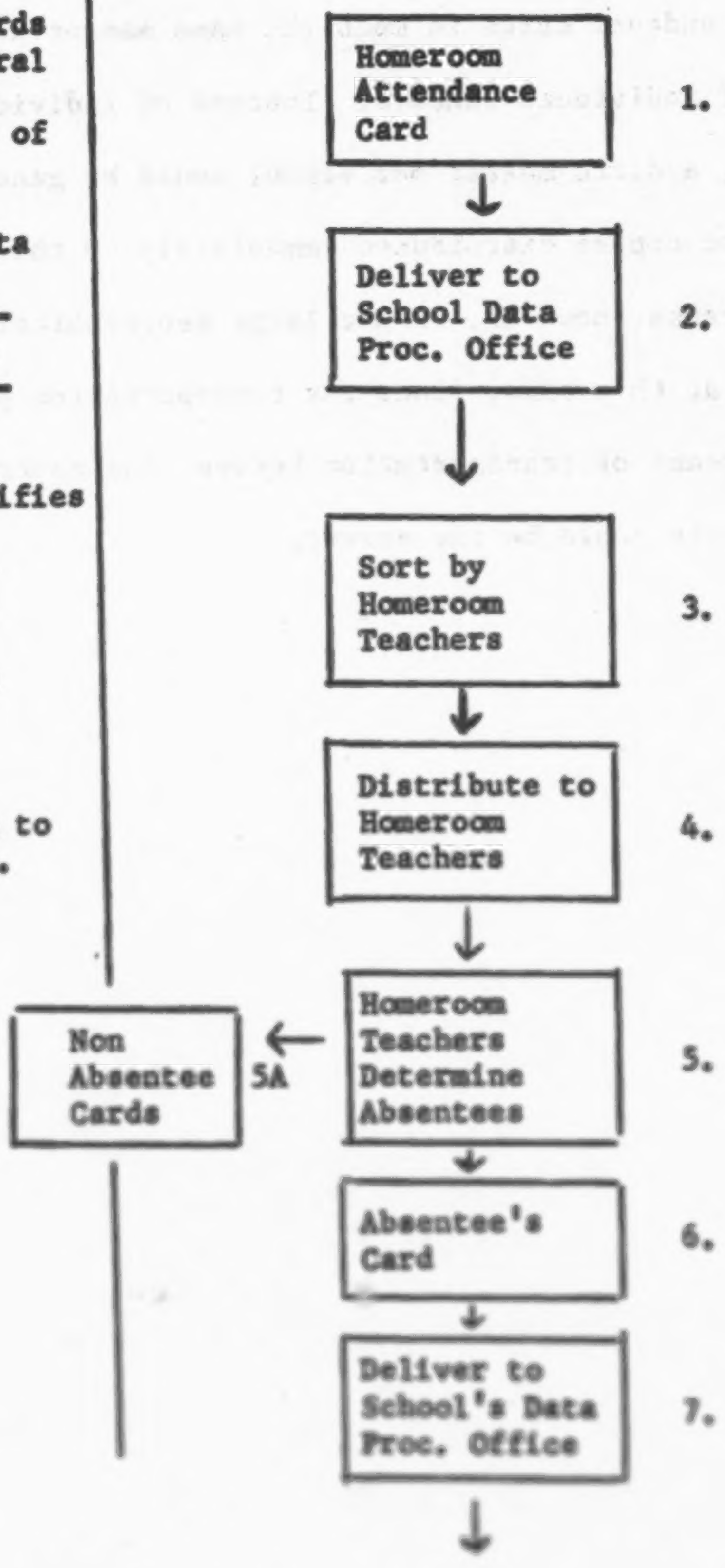
SECONDARY SCHOOL ATTENDANCE APPLICATION
Flow Description of Operation

1. **Homeroom attendance cards are originated by Central Data Processing Office prior to the beginning of a semester.**

2-3-4. **Individual school's data processing office is responsible for distribution of homeroom attendance cards to homeroom teachers.**

5. **Homeroom teacher identifies absentees and places absentee cards in predetermined place. 5A. Nonabsentee cards are held aside by homeroom teachers.**

6-7. **Hall monitors pick up cards and deliver them to data processing office.**


Homeroom Attendance Card
1.
Deliver to School Data Proc. Office
2.
Sort by Homeroom Teachers
3.
Distribute to Homeroom Teachers
4.
Homeroom Teachers Determine Absentees
5.
Non Absentee Cards
5A
Absentee's Card
6.
Deliver to School's Data Proc. Office
7.

SECONDARY SCHOOL ATTENDANCE APPLICATION
Flow Description of Operation

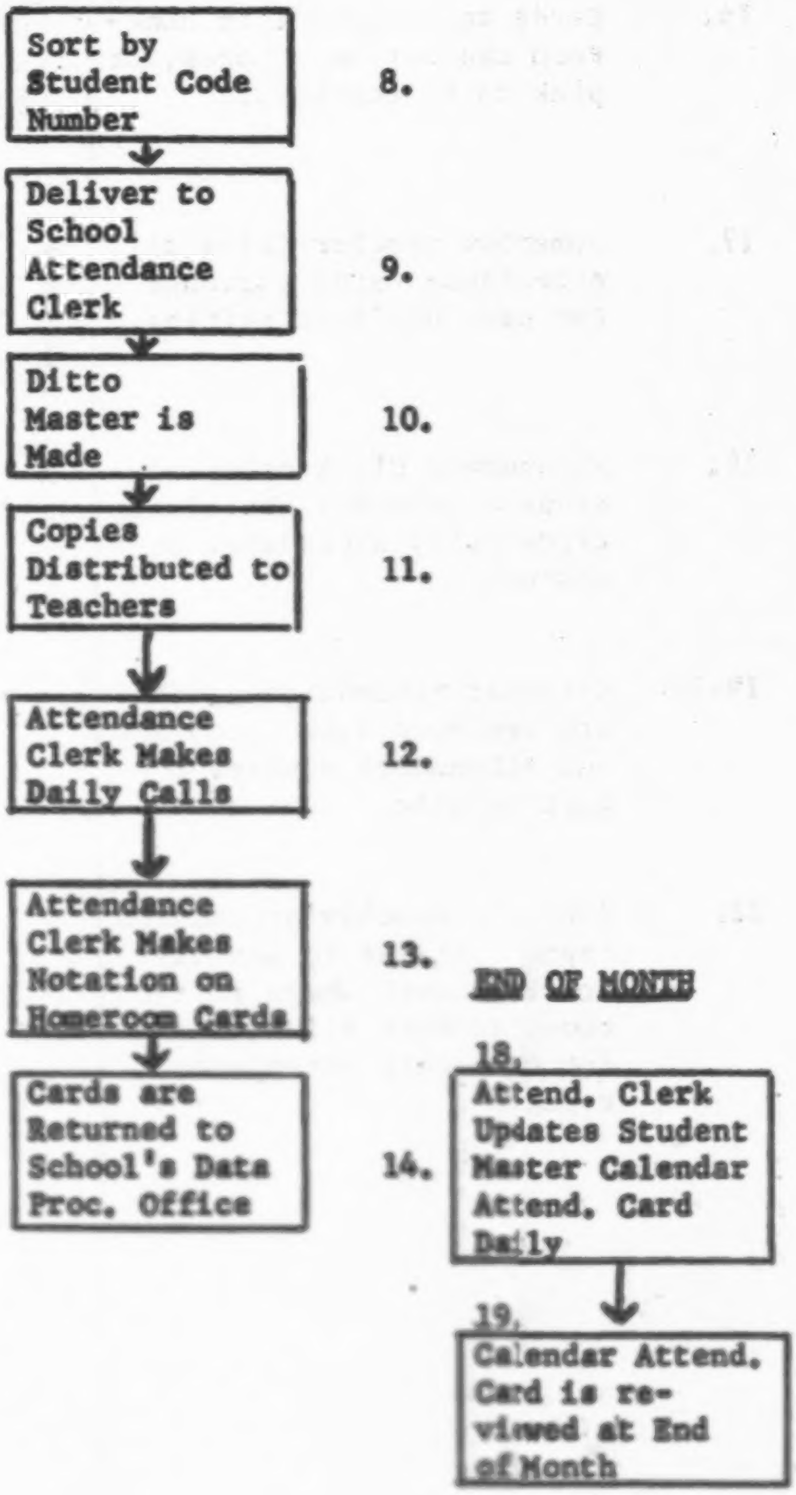
8. Cards are then sorted by student code number.

9-10. Cards are then delivered to school attendance clerk where a ditto-master is made.

11. Copies of absentee roster are distributed to each teacher.

12-13. Attendance clerk makes home phone calls and notes reason for absence on homeroom attendance cards

14-15. Cards are returned to data processing office where they are sorted into homeroom order.


Sort by Student Code Number
8.
Deliver to School Attendance Clerk
9.
Ditto Master is Made
10.
Copies Distributed to Teachers
11.
Attendance Clerk Makes Daily Calls
12.
Attendance Clerk Makes Notation on Homeroom Cards
13.
END OF MONTH
Cards are Returned to School's Data Proc. Office
14.
18.
Attend. Clerk Updates Student Master Calendar Attend. Card Daily
19.
Calendar Attend. Card is reviewed at End of Month

SECONDARY SCHOOL ATTENDANCE APPLICATION
Flow Description of Operation

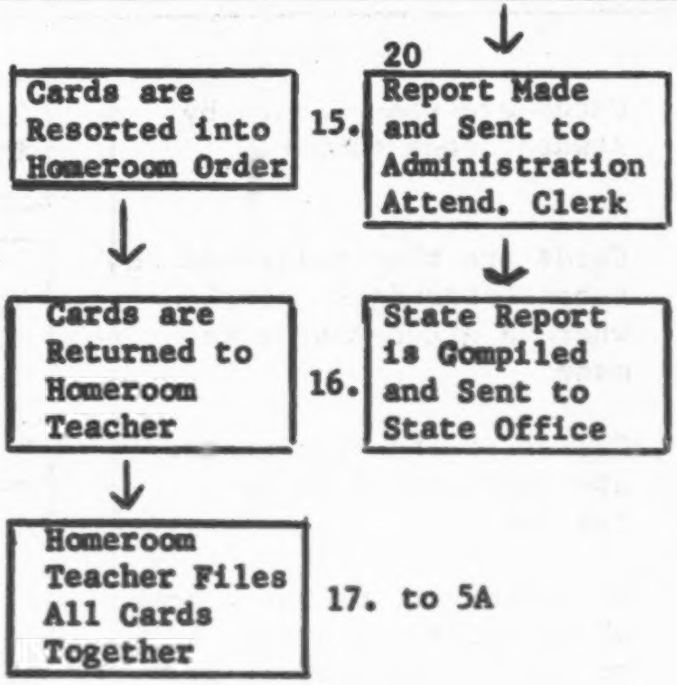
16. Cards are placed into homeroom teacher mail boxes for pick up by teachers.

17. Homeroom teacher files all attendance cards together for next day's activities.

18. Attendance Clerk notes on student calendar attendance cards daily attendance or absence.

19-20. Calendar attendance cards are reviewed each month and and attendance summary report is made.

21. School's monthly attendance report is sent to administration clerk where it is compiled with all schools for the state attendance report.


Cards are Resorted into Homeroom Order
Cards are Returned to Homeroom Teacher
Homeroom Teacher Files All Cards Together
17. to 5A
20
15.
Report Made and Sent to Administration Attend. Clerk
16.
State Report is Compiled and Sent to State Office

III. SUMMARY

Data Processing provides an opportunity to "stream line" your attendance records to require a minimum of staff time. The process can be developed for the basic equipment one would normally expect to use in an office of the more complex systems being developed for the computer system.

The State Department of Public Instruction has co-operated with many of the schools of the state in the development of processes to be used for student accounting. The auditors have agreed to accept the proof of attendance as provided by cards or original print-out documents.

The future development of this process will permit the State Department to maintain the records of attendance through tele-processing. Experimentation in this area is now being done. The future of data processing in this area causes one to be excited.

CHAPTER SEVEN

PUPIL ACCOUNTING FOR GRADE REPORTING

I. INTRODUCTION

Schools have generally entered into data processing for one of two reasons. In many schools, particularly in the eastern part of the United States, initial studies have been carried on by business officials for processing school business. Their use of data processing equipment has been justified on cost savings. In other schools the approach and justification for data processing has been through the efforts of principals, counselors, and teachers, who are endeavoring to save teachers' time, while at the same time improve record keeping. Here, justification is largely based upon the assumption that teachers are hired to teach rather than to be bookkeepers. A relief in clerical work leaves more time for teaching. Grade reporting has probably been the most popular data processing technique used in schools until the development of computer scheduling. School installations and service bureaus have successfully processed grade reporting for several years.

In order to run through data processing machines, data is usually in one of three forms; punched cards, paper tape, or magnetic tape. A good systems person is able to recommend changes in clerical procedures and records so that data ends up in card form.

II. EXAMPLE OF A TYPICAL GRADE REPORTING SYSTEM

The most economical processing of grade reports is afforded when grade cards are obtained as a by-product of student's scheduling application. For maximum use of grade cards, subsequent future evaluation and study, certain items of information should be contained in the grade card.

Near the end of each reporting period teachers are sent a group of grade cards for each class. The cards received may contain varied types of information depending upon the needs of the school. Table I lists the items often included in grade cards.

Table I

1. Student Name: The name will usually be confined to twenty to twenty-three card columns. Effort should be made to keep the name field as short as possible while still allowing for a complete legal name. First, middle, and last name should be spelled out, if possible.
2. Student Number: Methods of student number assignments are varied and complex depending upon the size of school or district. The primary objective is to have each student assigned a unique number. Another primary consideration is to have it as short as possible. Sex, year in school, school number, etc., may be incorporated into the student number to make it unique.
3. Teacher Number: A three of our digit number is often the space allotted for teacher identification on grade cards. A unique number with teacher initials will usually positively identify the teacher.

8

4. Course Identification: The name of the course and the ability level are usually placed within twelve or thirteen card columns.
5. Grades: One grade card maybe used for one semester or for the entire year. One mark sense column is usually reserved for each marking period.
6. Honor Points: Honor points are frequently used for computing class rank. Three or four columns are usually sufficient.
7. Absence: Reporting of absence by teacher will require card space.
8. Tardiness
9. Citizenship
10. School
11. Year in School
12. Fees
13. Semester
14. Home Room

Part of the above information such as name, sex, homeroom, course, teacher number, student number, etc., maybe punched at student scheduling time. Information such as grades, citizenship marks, absence, credits, and honor points maybe teacher entered by mark sensing or punching at grade reporting time.

The space reserved for items 8 through 14 is determined by individual schools as are all of the items included in the grade card. Only 80 columns of information may appear in one grade card. Card fields should be made as short as practical for this reason.

Teachers in schools usually indicate grades and attendance for machine reporting upon grade cards in one of three ways:

1. Mark-sensing

Mark-sensing with a special electrographic pencil allows any teacher anywhere to record grades "on-the-spot" in machine readable form. For recording, special pencils are supplied each teacher for making appropriate marks on pre-punched cards. The ease with which orignial data may be registered on the card and automatically made permanent through punched holes provides an accurate and dependable medium for the recording of student data. No manual transcription is involved from the marking of the card to the completed registration of the punches. The fewer marks a teachers must record on the card, the more accurate will be the reporting.

Special mark-sensing cards are available from suppliers that will process the lightest marks from an electro-graphic pencil.

The primary advantage of mark-sensing is the speed with which cards may be marked and processed.

2. Porta-punching

This type of reporting allows the teacher to punch grades, absence, and other information into grade cards by simply pushing out special prescored holes with a stylus.

Pre-punching of name, numbers, course, etc., combined with on-the-spot punching of grades and credits minimizes errors, eliminates key punching, and provides direct entry into grade cards.

3. Key Punching

Operator key punching is performed by key punching grades from a hand written entry upon the grade card or other document. This method is often preferred by teachers but has the objectionable "time lag" caused by the need for key punching.

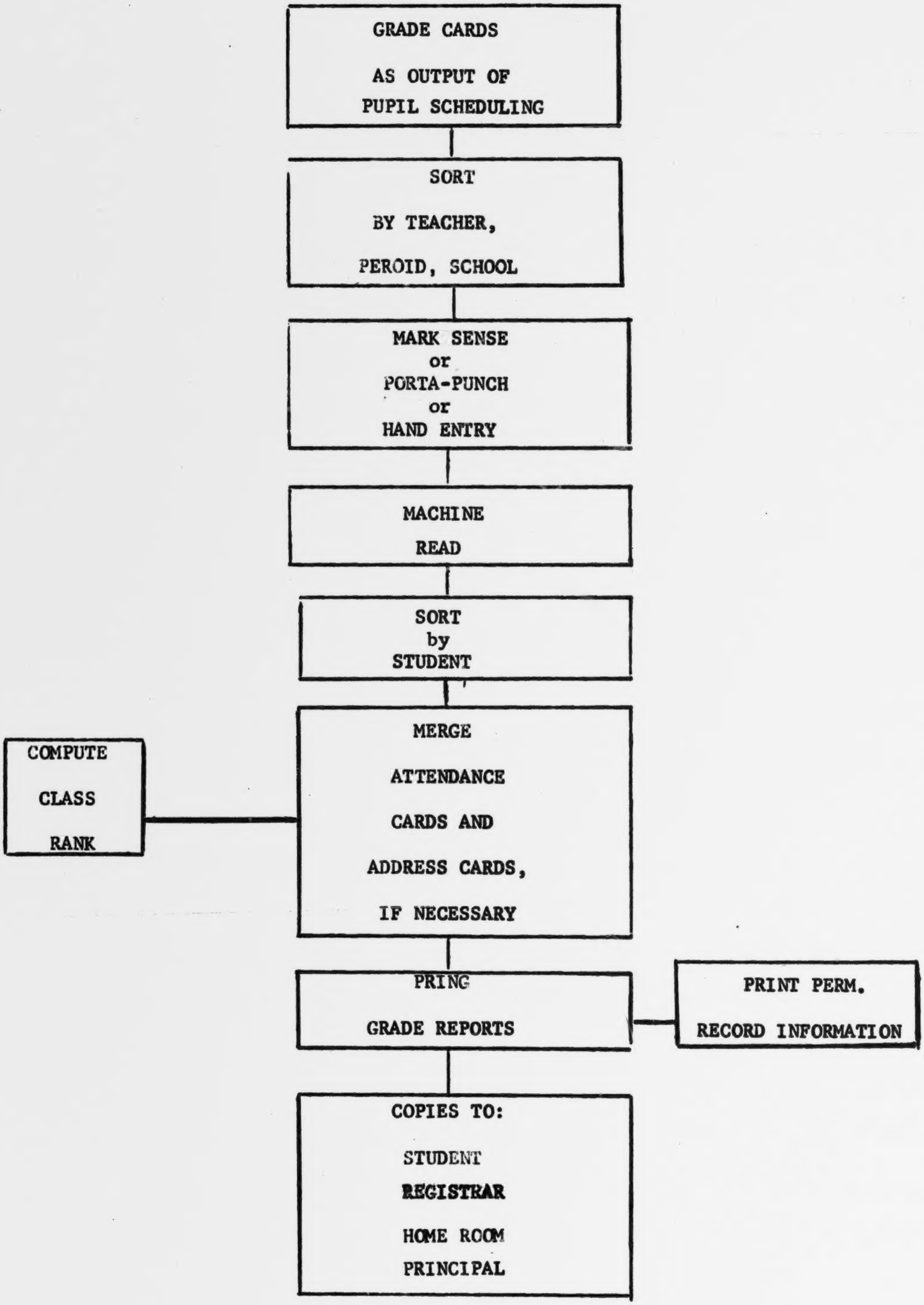
Following the punching of grades into grade cards, the cards are usually subjected to several sorts to place them into proper sequence for later printing.

The sequence and order of cards is a decision made by individual schools. Number sorts are faster than alphabetical sorts. Identification numbers for students, teachers, and home rooms are often assigned for purposes of easier and quicker sorting.

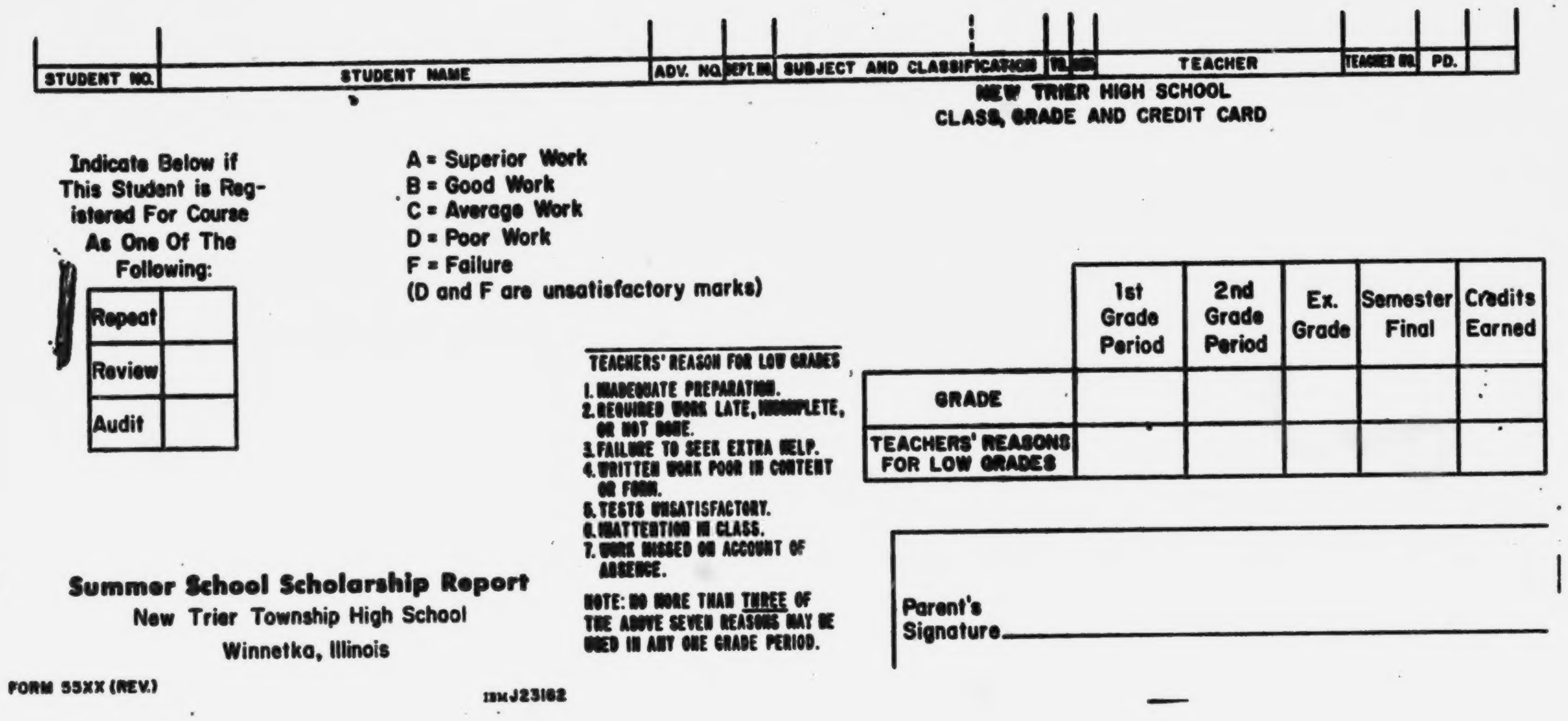
When grade cards are sorted, sequenced, and merged with all necessary student master cards, address cards, and attendance cards, they are ready for printing on multiple copy forms.

Printed grade reports usually contain the student's name, address, listing of subject, honor points, citizenship marks, credits, and attendance, as well as other pre-printed information. Information contained in manually prepared grade reports can usually be included on machine printed grade reports with more uniformity and accuracy with a saving of teacher time.

Absence reports, class sheets (having recorded grades), eligibility sheets, grade distribution reports, failure lists, honors lists, class rank lists, permanent record tabs, etc., are all possible reports following grade reporting with little extra effort and expense. Schools are prudent which start slowly with only student scheduling and grade reporting at first. After analysis and study, other areas of student accounting maybe developed one by one. Justification for data processing is not usually based upon cost savings alone; rather it should be justified by improving record keeping, by making possible additional reports, and by saving teachers' time.


GRADE CARDS
AS OUTPUT OF
PUPIL SCHEDULING
SORT
BY TEACHER,
PEROID, SCHOOL
MARK SENSE
or
PORTA-PUNCH
or
HAND ENTRY
MACHINE
READ
SORT
by
STUDENT
COMPUTE
CLASS
RANK
MERGE
ATTENDANCE
CARDS AND
ADDRESS CARDS,
IF NECESSARY
PRING
GRADE REPORTS
PRINT PERM.
RECORD INFORMATION
COPIES TO:
STUDENT
REGISTRAR
HOME ROOM
PRINCIPAL

SAMPLE GRADE CARDS



STUDENT NO.	STUDENT NAME	ADV. NO.	DEPT. NO.	SUBJECT AND CLASSIFICATION	YR.	SEM.	TEACHER	TEACHER NO.	PD.

NEW TRIER HIGH SCHOOL
CLASS, GRADE AND CREDIT CARD

Indicate Below if This Student is Registered For Course As One Of The Following:

Repeat	
Review	
Audit	

A = Superior Work
B = Good Work
C = Average Work
D = Poor Work
F = Failure
(D and F are unsatisfactory marks)

	1st Grade Period	2nd Grade Period	Ex. Grade	Semester Final	Credits Earned
GRADE					
TEACHERS' REASONS FOR LOW GRADES					

TEACHERS' REASON FOR LOW GRADES
1. INADEQUATE PREPARATION.
2. REQUIRED WORK LATE, INCOMPLETE, OR NOT DONE.
3. FAILURE TO SEEK EXTRA HELP.
4. WRITTEN WORK POOR IN CONTENT OR FORM.
5. TESTS UNSATISFACTORY.
6. INATTENTION IN CLASS.
7. WORK MISSED ON ACCOUNT OF ABSENCE.

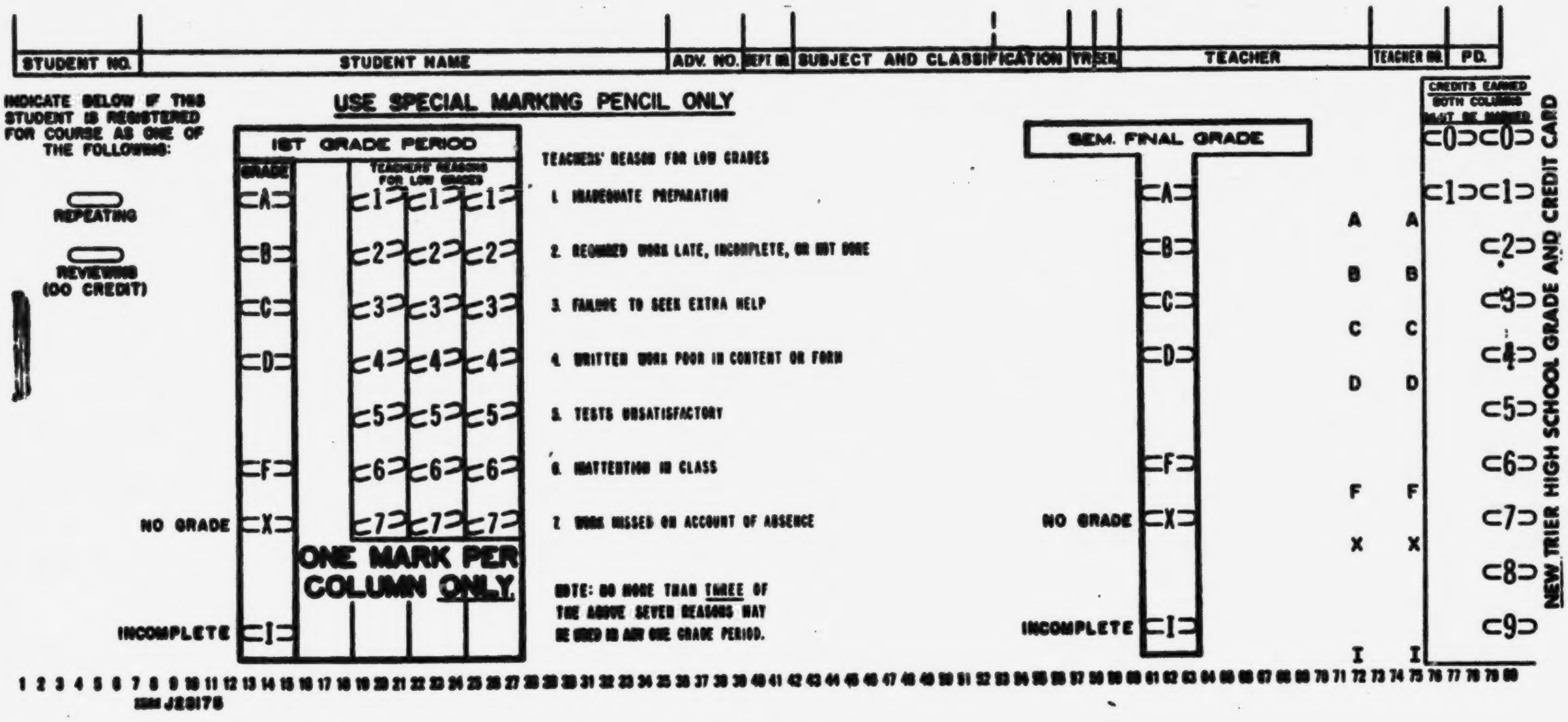
NOTE: NO MORE THAN THREE OF THE ABOVE SEVEN REASONS MAY BE USED IN ANY ONE GRADE PERIOD.

Parent's Signature ____________________

Summer School Scholarship Report
New Trier Township High School
Winnetka, Illinois

FORM 53XX (REV.)

IBM J23162



STUDENT NO.	STUDENT NAME	ADV. NO.	DEPT. NO.	SUBJECT AND CLASSIFICATION	YR.	SEM.	TEACHER	TEACHER NO.	PD.

INDICATE BELOW IF THIS STUDENT IS REGISTERED FOR COURSE AS ONE OF THE FOLLOWING:

○ REPEATING

○ REVIEWING (NO CREDIT)

USE SPECIAL MARKING PENCIL ONLY

1ST GRADE PERIOD

GRADE	TEACHERS' REASONS FOR LOW GRADES		
⊏A⊐	⊏1⊐	⊏1⊐	⊏1⊐
⊏B⊐	⊏2⊐	⊏2⊐	⊏2⊐
⊏C⊐	⊏3⊐	⊏3⊐	⊏3⊐
⊏D⊐	⊏4⊐	⊏4⊐	⊏4⊐
	⊏5⊐	⊏5⊐	⊏5⊐
⊏F⊐	⊏6⊐	⊏6⊐	⊏6⊐
NO GRADE ⊏X⊐	⊏7⊐	⊏7⊐	⊏7⊐
INCOMPLETE ⊏I⊐			

ONE MARK PER COLUMN ONLY

TEACHERS' REASON FOR LOW GRADES
1. INADEQUATE PREPARATION
2. REQUIRED WORK LATE, INCOMPLETE, OR NOT DONE
3. FAILURE TO SEEK EXTRA HELP
4. WRITTEN WORK POOR IN CONTENT OR FORM
5. TESTS UNSATISFACTORY
6. INATTENTION IN CLASS
7. WORK MISSED ON ACCOUNT OF ABSENCE

NOTE: NO MORE THAN THREE OF THE ABOVE SEVEN REASONS MAY BE USED IN ANY ONE GRADE PERIOD.

SEM. FINAL GRADE

⊏A⊐
⊏B⊐
⊏C⊐
⊏D⊐
⊏F⊐
NO GRADE ⊏X⊐
INCOMPLETE ⊏I⊐

A	A
B	B
C	C
D	D
F	F
X	X
I	I

CREDITS EARNED
BOTH COLUMNS MUST BE MARKED

⊏0⊐	⊏0⊐
⊏1⊐	⊏1⊐
	⊏2⊐
	⊏3⊐
	⊏4⊐
	⊏5⊐
	⊏6⊐
	⊏7⊐
	⊏8⊐
	⊏9⊐

NEW TRIER HIGH SCHOOL GRADE AND CREDIT CARD

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

IBM J28175

CHAPTER EIGHT

STUDENT SCHEDULING

Student scheduling can be defined as the process of assigning an appropriate time pattern, teacher, classroom, and the student to courses offered in the school curriculum. Student scheduling is not dissimilar to scheduling situations used in industry and business. Commercial airlines have a continuous problem of scheduling passengers, equipment, crews, air space, landing space, etc., now handled largely by computers.

Student scheduling in the past has been divided into two parts. One part, termed here as matter schedule making, includes the assignment of rooms, teachers, and time patterns to classes. Usually these assignments are made with little previous knowledge of student needs and desires. Ordinarily, the previous program of classes is used as a model for the current one. Student assignments are made separately as a second and little associated part of the procedure.

Few schools are using computers for a significant part of the job of making time, space, and instructors' assignments to courses. Many proposed innovations in education depend upon improved capabilities in construction the master schedule based upon student requests.

Some experimental work is being done, more needs to be performed. "Gasp" and "Stanford School Scheduling System" (SSSS) are new approaches to this need.

In school scheduling situations, preferences of teachers, principals, students, and administrators prescribe requirements which restrict the making of good master schedules. Some restrictions are good for some students, some restrictions are good for some teachers, but all preferences reduce the degree of freedom with which an individual student schedule may be made. Some restrictions result in direct conflicts. The computer will never be an arbitrator for these conflicts. It is a fast and competent clerk, but must be given all possible alternatives, together with the rules for following them. The computer will fit together large quantities of defined information and it will efficiently report the goodness of the fit. It will not resolve irresoluble conflict.

Computer programs are being used and improved upon which will generate the master schedule from parameters defined by administrators, teachers, and students. The programs are relatively new and as yet experimental. They require very large computers with specific machine configurations and for this reason may be little used because of their unavailability. These programs approach the need for generating a master schedule that will not cause irresoluble conflicts in scheduling.

Building a master schedule of classes is a laborious task. Developing the master schedule and sectioning of students through manual methods can take hundreds of hours depending upon the size and complexity of the school. Since the effort of hand scheduling and schedule making is usually the responsibility of a professional educator, it is important that all possible new methods to aid in scheduling be explored.

It is apparent that a better schedule can be constructed through the use of a computer, with less cost, at a valuable time saving, (if the school is justifiably large) and at the same time give improved plant utilization. It is of great importance to free the professional educator from menial tasks.

A saving in time may come in two ways. First, the overall number of man-hours expended in building the master schedule are reduced. After basic computer decisions have been made, the only task remaining is to prepare the computer input data for the second phase. Second, the preparation of machine input data can be processed by clerical help. There is a shift of much of the work to less highly trained personnel. Economy takes place in the reduction of the number of man-hours and the use of less highly trained personnel.

In addition to economy of time and money, other considerations about automatic student scheduling should be made. First, there is a charge that the student receives less personnal attention to his needs and interest than through a manual method. This may be countered by the fact that schedule making for a high percentage of all students is routine with little personal attention involved. Using a machine scheduling method allows the professional educator to spend more time on the low percentage of students requiring special attention. Second, there are relatively few people in the secondary schools or in teacher training institutions with a working knowledge of data processing. Regarding this consideration, it is pointed out that very little basic knowledge of data processing is required to be successful at student scheduling. Third, it may be said that programs for schedule generation are not sophisticated enough for general application.

Data processing people have a jargon all of their own. Discussing this area of electronics with experts makes only for further confusion. Most educators sit wide-eyed and listen to terms as "drum storage", "control panel," "B register", "Op code", "disk pack", "Fortran", "tape, 402". Fortunately, student scheduling is one operation that can be performed with very little knowledge of computers or other data processing equipment.

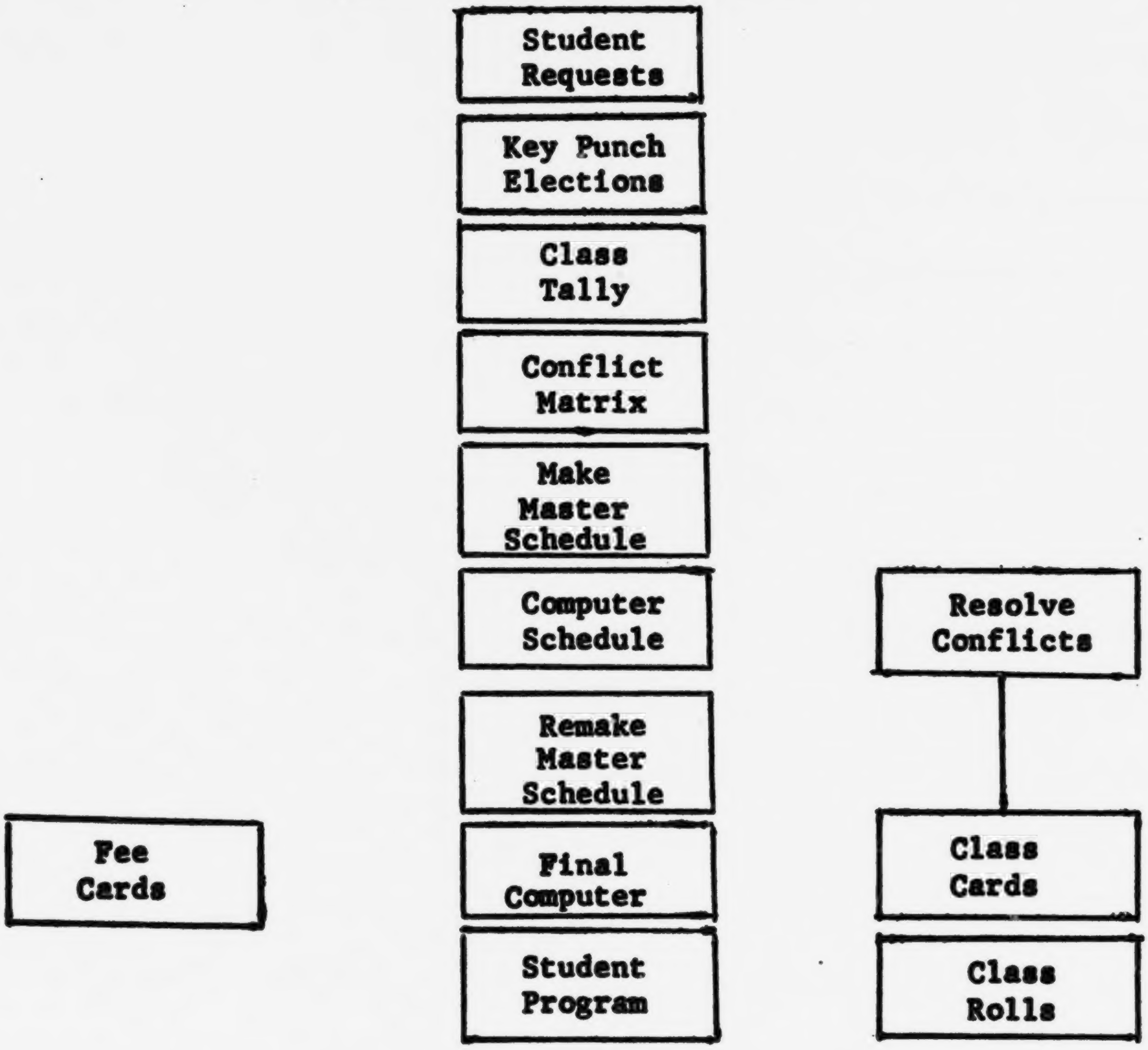
Basic Objectives of Class Scheduling

(1) To provide for considerable reduction in time on the part of an administrator in accomplishing the complete scheduling of students.

(2) To provide for the level distribution of students in classes.

(3) To minimize the number of students who have or will have conflicts because of class size or time.

CLASS SCHEDULING FLOW CHART


Student Requests
Key Punch Elections
Class Tally
Conflict Matrix
Make Master Schedule
Computer Schedule
Resolve Conflicts
Remake Master Schedule
Fee Cards
Final Computer
Class Cards
Student Program
Class Rolls

Definition of Terms

Section is a particular class meeting at a particular time and place.

Course is a group of one or more sections which have the same course content.

Master Schedule is a list of courses along with their assigned rooms, times, teachers, and seat capacities.

Period is a scheduled time interval in the school day.

Student Request for a student in a selection of approved courses the student would like to take. Students do not select sections.

Student Schedule is one section from the master schedule in each course of that student's request.

Student Requests usually reach the computer in the form of punched cards. These cards may contain the name, student number, grade, sex, etc. The student information field is limited in length. The punched card will also contain a series of unique numbered course code numbers that correspond to a particular course number classed on the master schedule.

Course Tally: Key punched student request cards are used for making course tally on the computer. A printed report listing course numbers and total student requests maybe secured quickly. There are two major purposes of a course tally. First, to edit input data for accuracy; Second, to count the students asking to be enrolled in a course.

Conflict Matrix: The job of analyzing potential conflicts has been simplified by tallying student requests for courses offered only one or two periods per day. The operation requires two considerations:

1. Defines the courses by course number offered only one or two periods.
2. Tallying the number of students who have requested the various combinations of courses on the list

The objective is to determine what single or double offerings may be offered during the same period of the school day without causing a conflict in a student's schedule.

Features of "Class" Scheduling

1. "Class" schedules students based on your master schedule and the students' approved course selections.
2. It balances classes based on the capacity of your rooms, and it will never exceed the class limits that you set.
3. It notifies you of any irresolvable conflicts.
4. It can be used for once-a-year or twice-a-year scheduling. Once-a-year scheduling involves scheduling two semesters at once and classes which may last one semester or all year.
5. It is capable of scheduling classes which do not meet all week, and it can handle classes which meet for more than one period. Classes can be any combination of several periods and different days of the week each period. It can handle a maximum of 21 periods per day.
6. It can schedule lunch periods and activity periods. It also can dismiss students early for jobs or sports.
7. It can schedule students into study halls during their free periods and avoid sequential study halls. It will allow you to schedule study halls in practically any way you desire.
8. It can punch student schedules and/or print them in any desired format. It can print any information desired about the students or classes on student schedules. The formats and information printed are completely up to you.

9. The program is capable of handling up to 400 courses and 1200 course selections in the master schedule.
10. The program is currently recommended for schools of 300 or more pupil enrollment.

Student scheduling is only a small part of educational data processing now being done. Fees, grade reporting, class rank, etc., are by-products of information available in a properly planned student scheduling system.

CHAPTER NINE

RENTAL AND RELATED COSTS FOR A CARD PUNCH INSTALLATION IN A BUSINESS OFFICE FOR A SCHOOL SYSTEM

I. INTRODUCTION

In this chapter an attempt will be made to provide information as to the approximate rental and related costs of a card system to be used in a business office for a school system. These data are based upon actual experiences and quotes from various school systems. Since money is usually a critical factor in any educational system, everyone should attempt to secure the most and best type of service for each tax dollar.

A card system should be so designed as to relieve the instructional personnel from some of the many clerical and administrative details, so that more time may be devoted to educational functions. No attempt is being made to promote any one type of equipment or system, only to express the opinions, views and experiences of schools now using a card system.

II. FACTORS INFLUENCING COSTS

A. Equipment

The most obvious expense is for the rental of the major pieces of data processing equipment. The key punch, card sorter and accounting machine, or tab, are considered to be the basic pieces of equipment that must be secured to provide a minimum of capability for a beginning card system. A school system could expect the rental on these pieces of equipment to be between

$300 and $400 a month. In most cases this would represent equipment with a limited capacity and speed. These three basic pieces will perform many operations and a considerable volume of data can be processed in much less time than by manual operation. In many instances manual manipulation of the cards or visual checking may be necessary.

The key punch is basically the same for all types of operations, although a few special features may be added, which will result in an increase in rental. Normally the rental is around $60 per month. The card sorter rents for approximately $40 per month and up, depending upon its speed and special features. The concept of operation is basically the same for all card sorters. Of the three basic items, the accounting machine is the most expensive and also the one on which the rental will vary the most. It will start around $200 per month and up to over $1000, again depending on the type, speed of operation and special features. Whenever discussing the rental of data processing equipment, one must be aware of the fact that only certain features are standard and are usually quoted as the basic rental fee. Special or optional features will add to the rental and increase the capabilities of the equipment.

Since it is usually advisable to start with the simple, slow speed equipment, one must be prepared to increase the speed or capability of the original items, or add new pieces as additional functions or procedures are implemented into the system. One of the first to be added may be the collator, which rents for about $80 per month and up. This machine will eliminate considerable amount of manual handling of cards and visual checking. The next item to be added might be a reproducing-summary punch and at the same time an interpreter would probably have to be added. The reproducing-summary punch rents for $125 and up, while the interpreter is around $100 per month. If there is a considerable amount of key punching of cards required, then a verifier may be needed. Its rental is about $60 per month, but another operator would also be necessary. Should the procedures now require multiplication and division, which is beyond the capacity of present personnel, a calculator may be required to perform these functions. Its rental is in the vicinity of $150 per month. Again, as a reminder, these rental figures are only approximate and additional features on any piece of equipment will increase the rental.

B. Staff

The pay of employees is another major item that has to be considered in figuring the cost of any data processing installation. In fact, this item may be the largest single expense for those installations having employees who devote their full time to the data processing. A good key punch operator can probably be employed for about $250 - $400 per month, depending upon experience and area of employment. A person familiar with punched card equipment and capable of operating the equipment, performing the necessary wiring of the control panels and giving assistance in establishing procedures and new jobs could probably be employed for about $450 - $700 per month. This will depend upon the size of the installation and the responsibilities assigned to that person. As the installation increases in size and functions, the employees would probably expect increases in compensation and a major increase in equipment might mean additonal employees.

C. Materials and Supplies

Whenever the cost of punched cards is discussed, you will undoubtedly hear The price of $1.00 to $1.05 per thousand quoted quite often. This is true for a plain, natural color card, with black ink, no distinguishing color or stripe and when ordered in certain quantities. If the order is below so many thousand, depending upon the vendor, there will probably be a minimum order charge. There is also the cost of the transportation to be taken into account. Other costs to consider are: Color stripes, different color cards, ink other than black, edge coating mark sense treatment, numerous other variations and special designs of formats. For these special designs or formats on the card, there is usually an initial charge of about $45 for what is called the electroplate, and then you pay the regular price for any cards ordered which use this design or plate. A card design for use on a small number of cards, say 1000, may result in the cards costing between $46 and $46.50 per thousand. An order of 100,000 or using that number of cards from the same design would reduce the cost to about $1.50 to $1.60 per thousand. In those instances where it is not necessary for personnel outside the data processing installation to be able to read data from the cards, it is sometimes better to use plain cards at a lower price until such time as a definite design has been worked out. This will eliminate re-design of plates and the added cost of each one.

Continuous paper of standard sizes 8½ X 11, 10 5/8 X 11, 13 5/8 X 11, 14 7/8 X 11 etc., are referred to as stock forms and are readily available from a number of business forms companies. The price of the paper varies according to the quality, quantity and the company. As an example:

8½ X 11	1 part	$2.25 to $4.00 per 1000
8½ X 11	2 part	7.25 to 12.00 per 1000
8½ X 11	3 part	11.25 to 20.00 per 1000

8½ X 11	4 part	14.25 to 27.00 per 1000
10 5/8 X 11	1 part	2.70 to 4.50 per 1000
10 5/8 X 11	2 part	8.50 to 13.75 per 1000
10 5/8 X 11	3 part	13.50 to 22.25 per 1000
13 5/8 X 11	1 part	3.25 to 5.00 per 1000
13 5/8 X 11	2 part	10.25 to 15.50 per 1000
14 7/8 X 11	1 part	3.50 to 5.50 per 1000

Plain paper or stock forms cannot be used for every operation. There are times when data has to be labeled on identified and other information pre-printed on the form. As with stock forms, the quality, quantity, size and company from which purchased determine the cost. Special design forms are more expensive than stock forms. There is usually a pre-set cost by all companies for the initial set up of the form and as a result the larger the order in number of copies the lower the cost per thousand forms. For example:

8½ X 7	4 part	$20 per 1000 on 25,000 order
8½ X 7	4 part	$25 per 1000 on 20,000 order
8½ X 7	4 part	$35 per 1000 on 15,000 order
8½ X 7	4 part	$60 per 1000 on 5000 order

Control panels are required for the operation of the accounting machine, reproducing punch, collator, interpreter and calculator. The number of panels required will depend upon the different applications being performed and the ability of the operators to perform the wiring functions. Applications that are repetitious should have panels wired especially for them, be so marked and be retained. The more difficult wiring jobs should also be retained even though they may be used only once a month or even once per quarter. Re-wiring too often may result in more lost machine time than the cost of the panels and wires. The cost of a panel will vary from about $15 to $75 depending on the type of machine in which it is to be used. The lower cost panels would be used on the collator, calculator, reproducing punch and interpreter. The more expensive panels are used with the accounting machines. Wires can be purchased as a compliment for a special board or in bundles according to size. The compliment of wires to use with a panel usually cost more than the panel. For example, a panel may cost $49 and the wires for it $56 or a panel $30.50 and the wires $93.50.

Ribbons are used on the key punch, interpreter and the accounting machine. The cost will vary from $1.00 to $4.50 depending on type, color, quantity or order and the company from which purchased.

Space to file cards while having ready access to them and storage space and files is an important item in so far as a card system is concerned. Working files should be metal drawers capable of holding 3,000 or more cards in a 3/4 of full support type drawer. A 20 drawer file such as this will cost approximately $250. The number of different jobs being done and the volume of cards that have to be readily available will determine the number of such files that will be required. Cards can be stored in the cardboard boxes in which they are received, but if future processing of these cards is anticipated, great care must be taken to prevent damage to the cards. Metal storage files and other types are available. Working files will normally cost about $2.00 to $3.00 per 1,000 cards. Storage files will run between 50 cents and $1.50 per 1,000 cards.

D. Housing

Building space and utilities must also be provided and considered in the cost of the installation. A small installation will occupy about 150 to 250 square feet of space, but room for expansion and files should also be provided.

E. Summary

In summary, the rental and related costs for a card punch system or installation in a business office include the rental of equipment, pay of employees, cost of cards, paper, forms, control panels and wires, files and space. A small or basic installation will result in an annual cost of between ten and fifteen thousand dollars. A medium size installation which might include a key punch, collator, card sorter, accounting machine, reproducing punch and interpreter, and performing a majority of the functions required in a school system would cost between twenty five and thirty thousand per year. This should cover all the costs that have itemized in the proceeding discussion.

CHAPTER TEN

POINTS TO CONSIDER ON THE ADAPTATION OF DATA PROCESSING TO PAYROLL PROCEDURES

I. INTRODUCTION

If your school district is considering adding equipment or personnel to the present payroll system, it may be advisable to investigate the use of Electronic Data Processing Equipment in the payroll operation. This will, of course, depend upon the size of the district, number of employees on payroll, frequency of payments and data and reports desired.

II. PHILOSOPHY AND RELATED OBJECTIVES

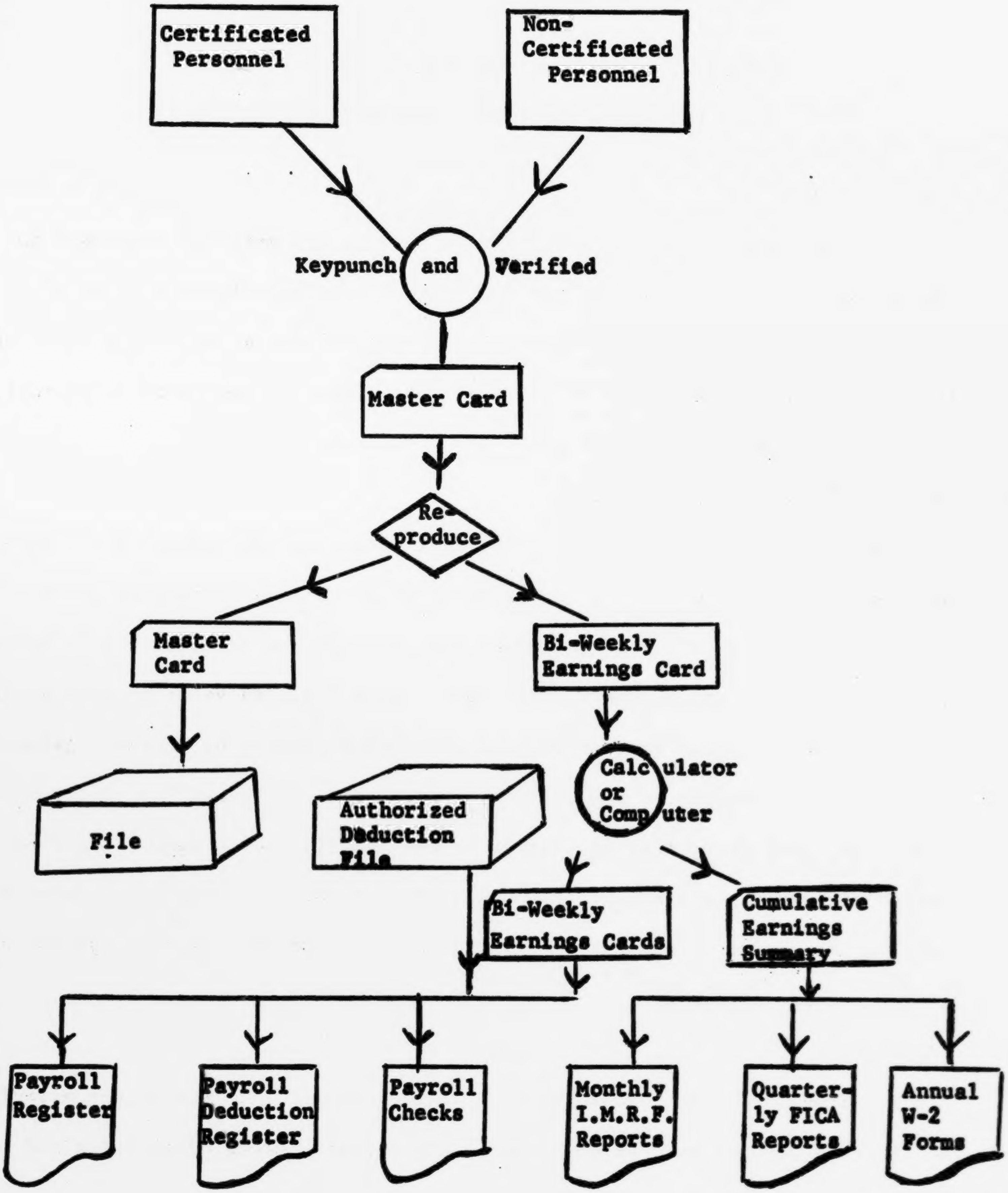
The dollar value to the school district cannot be overlooked, and a comparison of the cost of the present system against a data processing system should be made. In making this comparison, the various factors in each system have to be considered in their true light. Such items as value of data available and usable, speed and accuracy of each system should be weighed against rental or purchase costs, employees' salaries, etc. These will probably be the determining factors as to whether or not the district's payroll is converted to data processing. If the decision is favorable, then other factors have to be considered prior to converting from the present payroll system to a data processing system.

III. DESCRIPTION

The procedures to be followed in a logical manner from the source material to the finished product must be developed. The present method of securing and

GENERAL FLOW CHART

PAYROLL


Certificated Personnel
Non-Certificated Personnel
Keypunch and Verified
Master Card
Re-produce
Master Card
Bi-Weekly Earnings Card
File
Authorized Deduction File
Calculator or Computer
Bi-Weekly Earnings Cards
Cumulative Earnings Summary
Payroll Register
Payroll Deduction Register
Payroll Checks
Monthly I.M.R.F. Reports
Quarterly FICA Reports
Annual W-2 Forms

processing changes that affect an employee's pay may be readily adaptable to data processing. It is advisable to decide the type of pay system desired and then make provisions to secure the necessary information from the source material. The majority of school districts that use data processing in payroll procedures operate on the exception basis. Each employee, who is regularly employed, has a master pay file and is paid from that unless there is absence, overtime, or other factors which affect his pay.

The punched cards of each employee will contain many different types of data such as gross pay, absence, overtime, withholding tax, various types of pensions, other deductions, net pay, budget codes and employee numbers. To have ready access to this information, without having to process thousands of cards, it is necessary that certain data be kept in up-dated or cumulative cards and properly coded. The few hours spent in planning may save days of work at the end of a report period. All of the reports required from pay data such as Teachers' Pension Report, Illinois Municipal Retirement Report, Social Security Reports, W-2 Reports, conversion of pay to budget accounting, listings for annual published report, etc. can be obtained from the basic and up-dated punched cards.

The people who will operate this system may not be a problem, if the data processing equipment is already in use in the district and you are just adding the payroll as an additional operation. The present employees should be able to process the source material and present it to the data processing system in an acceptable format. If this is the first adaptation of the data processing equipment in your district, then you have two alternatives, either train your present employees or hire those already trained.

There are advantages to each, but if you are planning to expend the system to include all the operations of the district, perhaps more, it is advisable to secure trained personnel. They will be capable of assisting you in planning new operations and will be more familiar with your equipment limitations and capabilities.

IV. SUMMARY

In changing a payroll system, there is the problem of educating all the people who are in any way connected with the preparation of the payroll. All employees should be made aware of the new system being initiated and informed as to what it will mean to them. Some resistance to the change may be expected, but if the advantages of the system to the school district and to the employees are explained in detail, and the proper instructions disseminated, the majority of the employees will accept the new system.

CHAPTER ELEVEN

SUMMATION OF THE USE OF THE CRITICAL PATH METHOD IN THE BUILDING OF SCHOOL BUILDINGS

As in any new and important development such as the CRITICAL PATH METHOD (CPM) there is a cloud hovering over it of skepticism, doubt, and much confusion, and of course, the inevitable new terminology to be learned.

It has been said and written many times before that CPM is not the panacea, or cure-all, for the many problems that usually accompany a school building program. It is the latest innovation to planning, scheduling, and construction to assist in making accurate decisions. It represents the advent of the management by exception principle in an area of construction where this principle has not existed with any real degree of validity before. (The school administrator acts on only those items that do not conform to the overall CPM planning.)

It is no better than the adequacy and accuracy of the data at its base. Diagrams, time-estimates, planning, and scheduling must be carefully and realistically prepared, cooperatively by all the parties concerned.

It is a form of setting down on paper what one would normally have to do in one's thinking processes when about to construct a school building. It breaks down all the steps in the design and construction of a school building and arranges them into a specific, logical order. It takes into consideration the inter-relationships and coordination of all contractors and their subs. It lists all the activities on a periodic progress report which provides a basis for determining problems before they occur.

If a computer is used, several different solutions may be put through it providing the school administrator with the most favorable answer.

Consider the analogy of CPM to a family's personal budget. If one were the type of person who sets down on paper his estimated income and expenditures for a period of time, making allowances for certain unforeseen expenditures or receipts, he would be in a position to function more accurately. He would make better use of his personal funds, maximizing benefits gained with respect to investing, and minimizing costs of borrowed funds. This is not a necessity since most assuredly most of us have a rough idea in our minds what our income and expenditures will be for any given period of time. In other words, the budget is a tool to help a person to be more accurate. The more complicated one's personal investments, income, and expenditures become, the more need or value the budget has for him. The same is true of CPM in a simple building program in comparison to a more complicated building program.

Bear in mind that CPM is not a necessity. Many complicated, but excellent, school buildings have been built before the advent of CPM, and many will continue to be built without it. However, it is a proven set of valuable building management tools. Several schools have derived the full benefits currently available from the application of this new tool. All schools should consider its possible use, and try to keep abreast of the various extensions resulting from continuous research efforts.

The total cost of a CPM package for most of the schools being built today should run between $5,000 and $10,000 (set-up plus monthly reports). If there are complicating factors in the reporting, it could go higher. Be careful of bids that ask for a per cent of the total cost, and of those who quote cost as "so much per activity". This latter kind can often result in higher cost for the job, or in a job that is not as thoroughly done as it should be. You might keep in mind in selecting bidders that the more experience a contractor has had with CPM the more he has accepted and worked with it, the greater will be the benefits.

In the way of a summary, CPM is an educational device which will give the board members and the school administrators a better understanding of all of the activities involved in the design and construction of a school building and their inter-relationships. It will high-light critical activities and detect trouble spots early, giving the school administrator the ability to react rapidly to changing conditions. Emergency situations can be overcome in the most efficient manner. It will provide a simple means of analyzing projects and account for precise increments of work, pin-pointing individual responsibilities. Finally, it will give certain assurances that a school will be completed on time, and if delays do occur, immediate action can be taken at minimum expense.

CHAPTER TWELVE

WHERE DO YOU START - SERVICE BUREAU, RENT, OR BUY?

Many schools can now enjoy the advantages of rapid data handling without investing in expensive equipment. Medium size schools find that the outside EDP service center provides a practical way of speeding routine clerical jobs. Many schools have turned over pupil accounting procedures to outside centers and are completely satisfied with their results. Others look at the EDP center as an interim step before buying or renting their own equipment. A service bureau may provide an opportunity for the school to test out new procedures without paying directly for high cost equipment and an expensive staff.

The line between a smoothly functioning profitable relationship with a service bureau and a disappointing, high cost headache can be very narrow. Choice of the wrong service bureau, insufficient knowledge, and misconceptions about charges may add up to unhappy experiences. Before taking a step - have a complete study made by your school, citizens committee, teachers committee, or school accountants. Ask these questions:

1. What experiences with schools have the service bureaus had?
2. How many schools has the service bureau served?
3. Has the service bureau experience been in student accounting, business procedures, or both?
4. What back-up equipment is available?
5. What is the service bureau's geographic proximity to your school?

Costs are always important as well as benefits received through improved records and teaching morale. The following should be evaluated!

Who is to perform the following:

1. Wiring machine panels
2. Computer programming.
3. Forms design.

Equipment manufacturers may have service bureaus. One should be aware that equipment manufacturers try to organize your work about specific pieces of hardward, and they are principally interested in selling. Both are healthy and admirable conditions, but try to have the equipment process your work much as it has been done before. Do not change your well tested procedures and methods to accomodate a particular machine unless it is absolutely necessary.

It is easy to become a service bureau in this day. The rental of a few pieces of equipment, the acquisition of a building and shingle may qualify as a service bureau.

Banks and universities often serve as service bureaus for schools. They have been generous with their computers throughout the state of Illinois. As might be expected, however, these organizations are seldom set up for extending service. They will give or sell machine time as long as it does not conflict with their own needs. If a school already has its program prepared and simply needs machine time, this is a good source to investigate.

To further evaluate a service bureau consider the following:

A. Does the service bureau proposal fit your needs, and is it going to be an improvement over your present methods?

B. What will be the dollar cost; hourly, or rate per transactions process.

C. What is the service bureau's reputation among schools?

D. What is the appearance of the equipment, is there back-up equipment available?

E. What security and control is available?

In choosing a service bureau here are the most critical points:

1. Get your procedure straightened out before calling in a service bureau.
2. Watch out for the inexpert salesman.
3. Check the proposed contract carefully.
4. Retain ownership of the soft wear.
5. Make one person in your school or school system responsible for dealing with the center.

Use the same approach and standards in dealing with an EDP center as you do with any other vendor, or service firm. Don't expect the flow of good personal relations to make up for inconvenience and errors. And don't let the wonderment of electronics blind you to hard-headed dollar consideration. There's only one test of the service bureau - it should be doing the job more efficiently, or at lower cost than would be possible in your present office situation.

CHAPTER THIRTEEN

PROGRAMS AVAILABLE FOR COMPUTER INSTALLATIONS

School districts that are considering data processing installations should familiarize themselves with numerous publications and reference libraries distributed by manufacturers of data processing equipment.

The type of publications furnished by manufacturers usually fall into three categories.

1. Condensed System Information, i.e., introductory and summary publications of machine units and programming systems.
2. Machine System - a detailed publication for each unit and feature of the system and its physical installation.
3. Programming System - general and detailed publications for each programming system.

The above mentioned publications are usually in more detail than the brochures that are distributed for various systems considerations.

Category No. 1 above - Condensed System Information - usually is published in layman's language and describes the equipment in general indicating speed, flexibility, and programming languages to be used in writing machine instructions.

Category No. 2 - Machine System - these publications are written in detail informing system analysis personnel the exact functions and how to cause the equipment to execute these functions to produce the applications desired. They also give information relative to I/O devices (Input - Output), Magnetic Tape, Disk Storage, and Physical Planning Specifications.

Category No. 3 - Programming Systems - There are several models of computers available from each manufacturer and the publications are quite often categorized by model of each computer. After you have decided on a specific model, your library will be updated with the latest materials informing your staff of new features available for evaluation.

Included in this group are detailed books on various machine languages that might be used to instruct your computer system to perform the necessary steps to process your data.

In addition to the three groups mentioned above there are index catalogue listing program functions that have been written and tested by computer users from all sections of the country, and these programs may be adaptable to your problem, thereby eliminating hours and hours of study and program writing by your staff. These programs sometimes are referred to as "canned programs."

Computer manufacturers usually offer free schooling to train your staff in operating this equipment and in program development. This training is followed by manufacturer's system personnel to aid your staff in developing procedures and programs of complexity and to continue working with your staff until such time as they gain the necessary confidence and ability to carry on alone.

There are active organizations such as the Data Processing Management Association, consisting of people in your locality, that meet regularly. By participating, you meet numerous people, and through discussions with them, you exchange ideas and thoughts that can be useful.

There are other groups organized that offer memberships to personnel who operate computers of like nature.

CHAPTER FOURTEEN

Livonia Public Schools

ELECTRONIC DATA PROCESSING

POTENTIAL APPLICATIONS

EDUCATIONAL APPLICATIONS

1. Census
    - a. Analysis by census tracts
    - b. Age distributions
    - c. Reasons non-attendance
    - d. Updated records
    - e. Adult
2. Master Student Records
    - a. Counselors' lists (specify)
    - b. School directory
    - c. Telephone directory--school, central office
    - d. PTA directory
    - e. Name and address cards
    - f. Home room lists
    - g. Student locator cards
    - h. Mailing labels
3. Master Schedule
    - a. Course tally
    - b. Course conflict matrix
    - c. Student conflict lists
    - d. Master schedule lists
4. Student Scheduling
    - a. Student's program
    - b. Class lists/preliminary attendance lists
    - c. Program changes
    - d. Class size analysis
    - e. Room use analysis

EDUCATIONAL APPLICATIONS (contd.)

5. Attendance Accounting

   a. Teacher attendance lists
   b. Monthly attendance report--by student
   c. Monthly attendance summary--current and year-to-date, class, grade, and school
   d. Analysis of reasons for absence/withdrawal
   e. Analysis of new enrollments
   f. Growth reports--enrollment changes by grade, sex, school, etc.

6. Student Marks

   a. Marks reports
   b. Mark distributions, by teacher, subject, grade, class, or department
   c. Grade point averages (previous, current, required, deficient), alphabetical, ranking, weighted
   d. Selective grade lists--gifted or below average students, D's, F's, scholarship, eligibility
   e. Citizenship lists
   f. Interim progress reports--comment cards
   g. Analysis of teacher comments and marks

7. Permanent Records

   a. Gum labels of grades and credits
   b. Heading labels
   c. Gum labels of test results
   d. Gum labels of guidance data
   e. Micro-processing (microfilm, insert cards, etc.)

8. Test Scoring

   a. Scoring mark sense test cards
   b. Scoring answer sheets

9. Test Analysis

   a. Determination of local norms
   b. Cumulative frequency distributions
   c. Ranking list of test results
   d. Alpha or class lists of test results
   e. Correlation of test results
   f. Scattergrams
   g. Difference in scores
   h. Comparing scores of different tests
   i. Item analysis
   j. Profiles

10. Guidance

    a. Guidance records prepared from:

Environmental Factors	Grades
Health	Test Data
Activities and Interests	Attendance
Work Experience	Evaluations
Educational and Vocational Interests	Etc.

    b. Counseling cards

11. Research

    a. Class load studies--teacher load, class load, class size average, distribution and frequency of class sizes
    b. Pupil data studies
    c. Correlations
    d. Age in grade studies
    e. Student follow-up studies
    f. Drop-out studies
    g. Psychological case studies

12. Health Records

    a. General health records
    b. Immunization records
    c. Nurses call
    d. Physical fitness testing
    e. Student accidents
    f. Employee accidents

13. Student Activities

    a. Student body cards--identification
    b. Library cards
    c. Driving permits
    d. Student lockers
    e. Co-curricular activities and interests
    f. Student body elections
    g. Athletic classification
    h. Work experience
    i. Student billing
    j. Tickets for school events

BUSINESS APPLICATIONS

1. Appropriation
    a. Status of appropriation, allotments, encumbrances, expenditures, and receipts
    b. Transaction registers
    c. Financial reports
2. Audiovisual Aids Circulation Control
3. Budgeting
    a. Budget requests
    b. Budget worksheets
    c. Budget analysis
4. Bus Driver Licensing
    a. Statistics
5. Cafeteria
    a. Payroll
    b. Purchase orders
    c. Profit and loss statements
    d. General ledger
6. Cost Accounting
    a. Labor and material cards
    b. Job cost registers
7. Equipment Inventories
8. General Ledger
9. Libraries
    a. Circulation
    b. Cataloging
    c. Ordering and accounting

BUSINESS APPLICATIONS (contd.)

10. Other
    a. Data processing machine utilization studies
    b. Employee identification cards
    c. T. B. and X-ray service

11. Payroll (Certified, Non-certified, and Supplementary)
    a. Register
    b. Deduction registers
    c. Retirement reports
    d. Quarterly and annual reports
    e. Earnings record
    f. Salary analysis

12. Personnel
    a. Credential records
    b. Personnel statistics
    c. Strength reports
    d. Personnel rosters
    e. Teacher contracts
    f. Job evaluation

13. Purchasing
    a. Purchase orders
    b. Purchase order register
    c. Bid specifications
    d. Product and vendor analysis

14. Research
    a. Population mobility studies
    b. Site planning
    c. Salary projections
    d. Simulation studies
    e. Facility studies

BUSINESS APPLICATIONS (contd.)

15. Stores Accounting

    a. Transaction registers
    b. Stock status reports
    c. Stores delivery forms
    d. Physical inventory
    e. Backorder listings
    f. Stock catalogs

16. Surveys

    a. Teacher
    b. Community
    c. Salary

17. Textbooks

    a. Circulation control
    b. Textbook adoption lists
    c. Textbook inventories and entitlements